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ABSTRACT

This curriculum guide consists of seven packets of material for use in teaching a course on body structure and function. Addressed in the individual sections are the following topics: the digestive system; the buccal cavity; the gastrointestinal system; the intestines; the liver, gall bladder, and pancreas; the digestion of food, and the absorption of nutrients. Each section contains an introduction; a list of objectives; a list of procedures for students to follow when completing the lesson; an informational assignment; one or more information sheets; one or more activity sheets; a student evaluation; and a detailed lesson plan that includes lesson objectives, a list of supplementary teaching and learning items needed, references, an introduction to the lesson, a detailed outline of information to be covered during the lesson, interaction items, classroom and laboratory activities, evaluation items, and answer keys to the student evaluation and activities. (MN)

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HO-R83-501-507

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Health Occupations

500 Body Structure and Function

Funded by
Missouri Department of Elementary
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HO-R83-501

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Health Occupations

500 Body Structure and Function

01 Preview of the Digestive System

Date Started ____________

Student ________________________

Date Completed ____________

Approved ____________

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INTRODUCTION

Our body is able to survive and function with the assistance of nutrients we consume in our diet. Yet, these nutrients would be useless if our digestive system were unable to transform them into elements our body is capable of utilizing . In this lesson, previewing the digestive system, you'll learn what organs comprise this system which is responsible for the transformation of nutrients. Using this basic information to build on, you will be able to broaden your knowledge of normal structure and function of the digestive system and eventually apply the information to the care of patients in the clinical area which may have deviations from normal.

OBJECTIVES

Following completion of this module the student should be able to:

1. Name the functions of the digestive system
2. Recognize other names given to the digestive system
3. Identify the organs that comprise the digestive system
4. Identify accessory organs to the digestive system
5. Label a diagram showing the structure of the wall of the alimentary canal
6. Identify the peritoneal structures and their function

PROCEDURE

1. Review the objectives for this module
2. Read the information assignment
3. Obtain the slide tape presentation
4. Turn to page 3, the information sheet, and proceed through the slide tape presentation jotting down notes as necessary
5. Complete the activity sheet
6. Refer back to the objectives to be sure they have been met
7. Check with your instructor prior to completing the post test and proceeding to the next module

INFORMATIONAL ASSIGNMENT

Read one of the following:

Anthony, Catherine, and Alyn, Irene, Structure and Function of the Body, pp. 384-385, C. V. Mosby Co. 1975.

Memmler, Ruth and Rada, Ruth, Structure and Function of the Human Body, pp. 157-158, J. B. Lippincott Co. 1970.

Tortoro, Gerald J., and Anagnostakos, Nicholas P., Principles of Anatomy and Physiology, pp. 596-599, Harper and Row 1981.

The introductory section to the digestive system in your particular text.

INFORMATION SHEET

The digestive system has two functions. First, it prepares food for absorption by mechanical and chemical digestion.

Mechanical digestion changes the state of food much like the state of a cookie is changed when it is crumbled.

Chemical digestion alters the chemical structure of food, breaking it down into simpler compounds.

The second function of the digestive system is the elimination of wastes.

The organs of the digestive system form a tube about 30 feet in length that reaches from the mouth to the anus. This digestive tube or system has several other names: the gastrointestinal tract; the GI tract, or GI system; or the alimentary canal. The organs that fit together to form this system include: the mouth, the pharynx, the esophagus, the stomach, and the intestines.

Accessory organs assist the organs of digestion with their functions. They include: the teeth, the salivary glands, the liver, the gallbladder, the pancreas, and the vermiform appendix.

The entire digestive system is comprised of four different layers of tissue.

A mucous layer lines the inside of the digestive tube.

A connective tissue layer containing blood vessels lies outside the mucous lining.

A muscular layer lies outside the connective tissue.

And, finally, a serous layer called the peritoneum surrounds the outside of the tube. The characteristics of these tissue layers vary from organ to organ.

For example, the mucous lining of the stomach has many folds called rugae.

Also, the mucous lining of the small intestines has many microscopic projections called villi.

Another structure comprised of serous membrane is the peritoneum. It lines the walls of the abdominal and pelvic cavities. Folds of the peritoneum which support the intestines is called the mesentary. The mesentary is a thin fan-like structure. It originated in the lumbar area and attaches to the small intestine at the wide end.

The mesentaric function is to suspend the small intestine and carry the blood and nerve supply.

Another large fold of peritoneum is the greater omentum. It has an apron-like appearance that attaches to the lower edge of the stomach and upper intestine and hangs loosely over these organs.

The greater omentum functions during injuries to envelope the injuries and wall of the inflamed areas.

The lesser omentum is another portion of the peritoneum. It originates at the upper surface of the stomach and extends to the liver.

In the final section of this module, the major points presented will be summarized.

The digestive system prepares food for absorption and eliminates waste.

Organs that comprise the digestive system are: the mouth, pharynx, esophagus, stomach, and the intestines.

Accessory organs that aid in the digestive process are: the teeth, salivary glands, liver, gallbladder, pancreas, and vermiform appendix.

The structure of the wall of the alimentary canal is composed of four layers of tissue and the characteristics of these layers vary from organ to organ.

HO-R83-501

ACTIVITY SHEET

1. Name two functions of the digestive system.

2. Where would physical changes, or mechanical digestion, begin?

3. Where would chemical changes, or chemical digestion, begin?

4. What names have you heard given to the digestive system?

5. What organs compose the digestive system?

6. What organs are accessory organs to the digestive system?

7. What distinguishes organs of digestion from accessory organs?

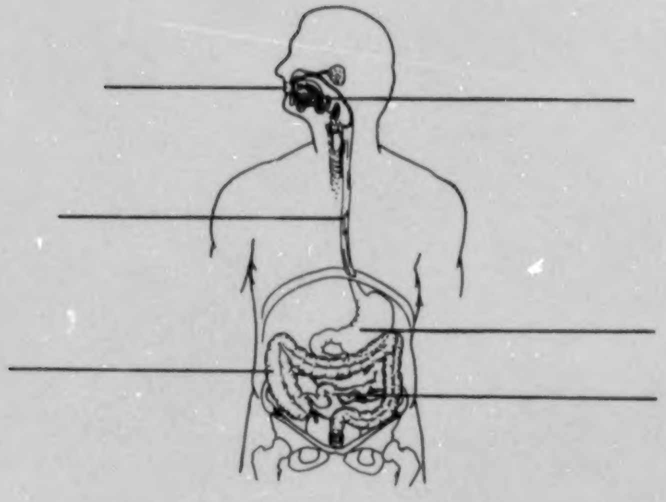
8. What is the peritoneum?

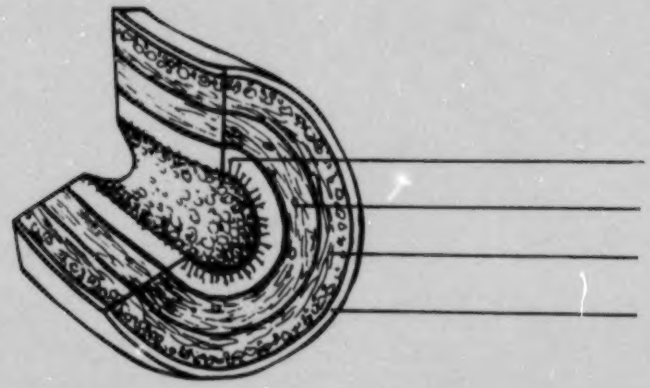
ACTIVITY SHEET

Activities

1. Locate the organs of the digestive system on available models and/or charts.
2. Locate the accessory organs of the digestive system on available models and/or charts.
3. Label the layers of tissue on the following page.
4. Locate the peritoneal structures on available models.
5. Label the diagram of the digestive system on the following page.

ACTIVITY SHEET





___Pre-test
___Post test

Student ______________________

STUDENT EVALUATION

Preview of the Digestive System

1. The functions of the digestive system are

   a. ____

   b. ____

___ 2. The digestive system is also known as the

   a. Gastrointestinal tract

   b. G.I. system

   c. alimentary canal

   d. all of the above

3. List the organs that comprise the digestive system.

   a. ______________________

   b. ______________________

   c. ______________________

   d. ______________________

   e. ______________________

___ 4. Accessory organs to digestion include

   1. teeth
   2. stomach
   3. intestines
   4. liver
   5. pancreas

   a. 1,2,5

   b. 1,4,5

   c. 2,3,4

   d. 3,4,5

5. Label the following diagram showing the layers of tissue of the digestive system.

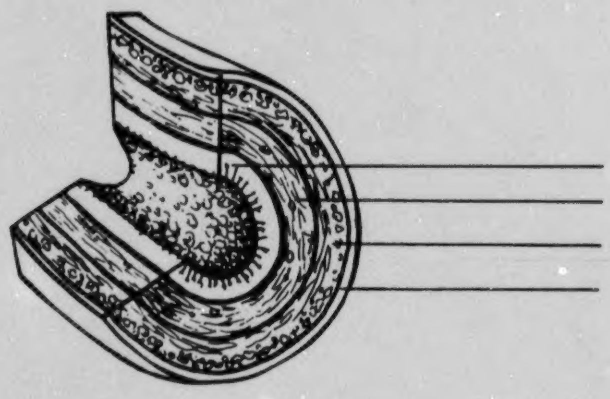
6. A fan-like structure that originates in the lumbar area and spreads out to attach to the small intestine is the ______________.

7. An apron-shaped extension of peritoneum that attaches to the lower edge of the stomach and upper intestine and hangs over these organs is the ______________ ______________.

8. The portion of the peritoneum that originates at the upper surface of the stomach and extends to the liver is the ____________ ____________.

9. The function of the mesentary is to suspend the small intestine and carry the blood and nerve supply.
___ True ___ False

10. Label the following diagram.



LESSON PLAN # 501

LESSON PLAN FORMAT

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # GASTROINTESTINAL SYSTEM
(UNIT TITLE)

SCOPE OF UNIT: Identify the component parts of the gastrointestinal system and explain how they fit together and function to choose nutrients necessary for the performance of body processes.

INFORMATION TOPIC # 501 OR DEMONSTRATION #

Preview of the Digestive System
LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

1. Name the functions of the digestive system.
2. Recognize other names given to the digestive system.
3. Identify the organs that comprise the digestive system.
4. Identify accessory organs to the digestive system.
5. Label a diagram showing the structure of the wall of the alimentary canal.
6. Identify the peritoneal structures and their function.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Slide/tape presentation-Preview of the Digestive System.
2. Slide projector
3. Screen
4. Tape player
5. Individualized instruction module
6. Anatomical models or charts of digestive system as available

	(Name)	(Date)	Special Learning Features For:
Written By:	D. Hathaway	11-77	
Revised	A. Young	2-83	
Instructional Delivery System By:			

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INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

1. Slide/tape presentation-Preview of the Digestive System.
2. Student information packet "Preview of the Digestive System."
3. One of the following or similar information in student's text:
    a. Anthony, Catherine and Alyn, Irene, Structure and Function of the Body, pp. 384-385, C. V. Mosby Co., 1975.
    b. Memmler, Ruth and Rada, Ruth, Structure and Function of the Human Body, pp. 157-158, J. B. Lippincott Co., 1970.
    c. Tortoro, Gerald J. and Anagnostakos, Nicholas P., Principles of Anatomy and Physiology, pp. 596-599, Harper and Row, 1981.

REFERENCES: (BIBLIOGRAPHY DATA)

In addition to the above:

1. Anthony, Catherine and Kolthoff, Norma, Textbook of Anatomy and Physiology, C. V. Mosby Co., 1971.
2. Miller, Marjorie and Leavell, Lutie, Anatomy and Physiology, Mac Millan Publishing Co. Inc., 1972.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Our body is able to survive and function with the assistance of nutrients we consume in our diet. Yet, these nutrients would be useless if your digestive system were unable to transform them into elements our body is capable of utilizing. In this lesson--Previewing the Digestive System--you'll learn what organs comprise this system which is responsible for the transformation of nutrients. Using this basic information to build on, you will be able to broaden your knowledge of normal structure and function of the digestive system and eventually apply the information to the care of patients in the clinical area which may have deviations from normal.

LESSON PLAN # 501

COURSE TITLE/NO. Body Structure and Function

UNIT # 501 — Gastrointestinal System
(Unit or Block Title)

INFORMATION TOPIC # 501 (Technical - General - Guidance)

TITLE: Preview of the Digestive System

OUTLINE:

- I. Functions of the digestive system
  - A. Prepare food for absorption
    - 1. Through physical changes (mechanical digestion) II #1
    - 2. Through chemical changes (chemical digestion) II #2
  - B. Elimination of waste products
- II. Organs of digestion form a tube from the mouth to the anus about 30 feet in length.
  - A. The tube (digestive system) has several names II #3
    - 1. Gastrointestinal tract
    - 2. GI tract or GI system
    - 3. Alimentary canal
  - B. Organs that comprise the digestive system II #4
    - 1. Mouth
    - 2. Pharynx
    - 3. Esophagus
    - 4. Stomach
    - 5. Intestines
- III. Accessory organs assist the digestive system with its functions II #5
  - A. Teeth
  - B. Salivary glands
  - C. Liver
  - D. Gallbladder
  - E. Pancreas
  - F. Vermiform appendix II #6
- IV. The entire digestive system is composed of four layers of tissue II #7
  - A. Mucous lining.
  - B. A connective tissue containing major blood vessels
  - C. Muscular coat
  - D. Serous covering
    - 1. Structure of the layers vary from organ to organ
      - a. Rugae - mucous lining in stomach has folds
      - b. Villi - mucous lining in intestines has projections
      - c. Peritoneum - serous membrane that lines the walls of the abdominal and pelvic cavities and encloses the viscera II #8
        - 1. Mesentary
          - a. Thin fan-like structure

        - b. Originates in lumbar area
        - c. Attaches to small intestines at wide end
        - d. Functions
            - 1. Suspend small intestine
            - 2. Carry blood vessels
    - 2. Greater omentum
        - a. An apron shaped double fold of peritoneum
        - b. Attaches to the lower edge of the stomach and upper intestine
        - c. Hangs loosely in front of the stomach and intestines
        - d. Functions during injury
            - 1. Envelopes injury
            - 2. Walls off inflamed area
    - 3. Lesser omentum II #9
        - a. Originates at the upper surface of the stomach
        - b. Extends to the liver

V. Summary and conclusions
- A. Digestive system prepares food for absorption and eliminates waste.
- B. Organs that comprise the digestive system are: the mouth, pharynx, esophagus, stomach, and the intestines.
- C. Accessory organs that aid in the digestive process are: the teeth, salivary glands, liver, gallbladder, pancreas, and vermiform appendix.
- D. The structure of the walls of the alimentary canal is composed of four layers of tissue and the characteristics of these layers vary from organ to organ.
- E. In the next module we will discuss the buccal cavity.

LESSON PLAN # 501

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 501 — GASTROINTESTINAL SYSTEM
(Unit Title)

INFORMATION TOPIC # 501 or DEMONSTRATION # ______

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Where would physical changes or mechanical digestion begin?
2. Where would chemical changes or chemical digestion begin?
3. What names have you heard given to the digestive system?
4. What organs do you think compose the digestive system?
5. What do you think would be accessory organs to the digestive system?
6. What distinguishes organs of the digestive system from the accessory organs?
7. Recalling the earlier units where you studied types of membranes, what type membrane do you think would line the digestive system on the inside? the outside?
8. What is the peritoneum?
9. Name three portions of the peritoneum.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Locate the organs of the digestive system on available models and/or charts.
2. Locate the accessory organs of the digestive system on available models and/or charts.
3. Label the layers of tissue on the diagram provided in the student packet.
4. Locate the peritoneal structures on available models and/or charts.
5. Label the diagram of the digestive system provided in the student packet.

LESSON PLAN # 501

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 501 — GASTROINTESTINAL

(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

(See Following Pages)

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ACTIVITY SHEET
KEY

1. Name two functions of the digestive system.

   a. Prepare food for absorption

   b. Elimination of waste products

2. Where would physical changes, or mechanical digestion, begin?

   In the mouth

3. Where would chemical changes, or chemical digestion, begin?

   In the mouth

4. What names have you heard given to the digestive system?

   Gastrointestinal tract, GI tract, and alimentary canal

5. What organs compose the digestive system?

   Mouth, pharynx, esophagus, stomach, and intestines

6. What organs are accessory organs to the digestive system?

   Teeth, salivary glands, liver, gallbladder, pancreas, and vermiform appendix

7. What distinguishes organs of digestion from accessory organs?

   Accessory organs are apart from the digestive tract and empty substances into it.

8. What is the peritoneum?

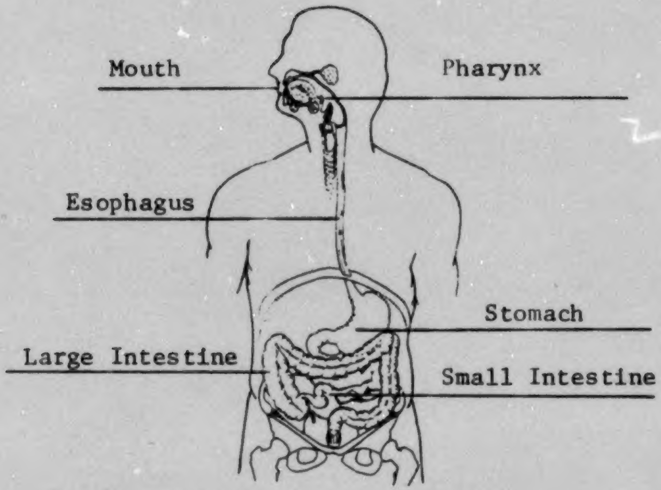
   The serous membrane that lines the abdominal cavity.

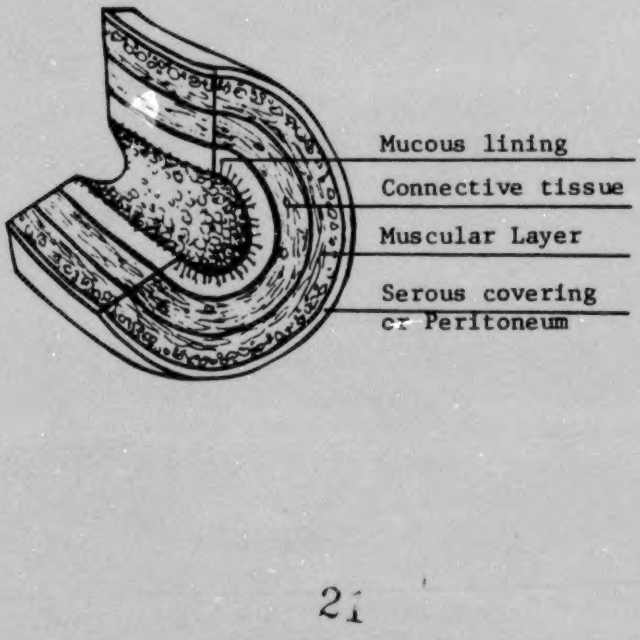
ACTIVITY SHEET
KEY

Activities

1. Locate the organs of the digestive system on available models and/or charts.
2. Locate the accessory organs of the digestive system on available models and/or charts.
3. Label the layers of tissue on the following page.
4. Locate the peritoneal structures on available models.
5. Label the diagram of the digestive system on the following page.

ACTIVITY SHEET KEY


Mouth
Pharynx
Esophagus
Stomach
Large Intestine
Small Intestine


Mucous lining
Connective tissue
Muscular Layer
Serous covering or Peritoneum

___Pre-test
___Post test

Student ____________________

KEY

STUDENT EVALUATION

Preview of the Digestive System

1. The functions of the digestive system are

a. Preparation of food for absorption

b. Elimination of waste

d 2. The digestive system is also known as the

a. Gastrointestinal tract

b. G.I. system

c. alimentary canal

d. all of the above

3. List the organs that comprise the digestive system.

a. Mouth

b. Pharynx

c. Esophagus

d. Stomach

e. Intestines

b 4. Accessory organs to digestion include

1. teeth	a. 1,2,5
2. stomach	b. 1,4,5
3. intestines	c. 2,3,4
4. liver	d. 3,4,5
5. pancreas	

5. Label the following diagram showing the layers of tissue of the digestive system.

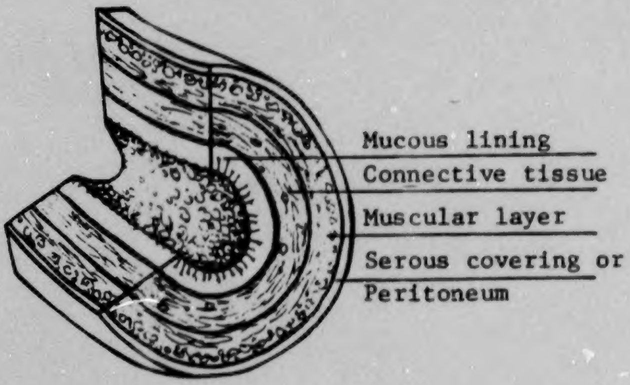
6. A fan-like structure that originates in the lumbar area and spreads out to attach to the small intestine is the mesentery.

7. An apron-shaped extension of peritoneum that attaches to the lower edge of the stomach and upper intestine and hangs over these organs is the greater omentum.

8. The portion of the peritoneum that originates at the upper surface of the stomach and extends to the liver is the lesser omentum.

9. The function of the mesentary is to suspend the small intestine and carry the blood and nerve supply.
X True ___ False

10. Label the following diagram.


Mucous lining
Connective tissue
Muscular layer
Serous covering or
Peritoneum

HO-R83-501 PREVIEW OF THE DIGESTIVE SYSTEM - SCRIPT

1. A presentation of The Media Center, State Fair Community College, Sedalia, Missouri.

2. HO-R83-501 Preview of the Digestive System is the first module of the Gastrointestinal Unit for the course, Body Structure and Function.

3. Our bodies are able to survive and function with the assistance of nutrients we consume in our diets. Yet, these nutrients would be useless if our digestive systems were unable to transform them into elements our bodies are capable of utilizing.

4. In this module you will learn what organs comprise the digestive system as well as the accessory organs which aid in the digestive process.

5. Using this basic information to build on, you will be able to broaden your knowledge of normal structure and function of the digestive system and eventually apply the information to the care of patients in the clinical area which may have deviations from normal.

6. After completing this module, you should be able to: (1) Name the functions of the digestive system.

7. (2) Recognize other names given to the digestive system.

8. (3) Identify the organs that comprise the digestive system.

9. (4) Identify accessory organs to the digestive system.

10. (5) Label a diagram showing the structure of the wall of the alimentary canal.

11. (6) Identify the peritoneal structures and their functions.

12. The digestive system has two functions. First, it prepares food for absorption by mechanical and chemical digestion.

13. Mechanical digestion changes the state of food much like the state of a cookie is changed when it is crumbled.

14. Chemical digestion alters the chemical structure of food, breaking it down into simpler compounds.

15. The second function of the digestive system is the elimination of wastes.

16. The organs of the digestive system form a tube about 30 feet in length that reaches from the mouth to the anus. This digestive tube or system has several other names:

17. The gastrointestinal tract; the GI tract, or GI system; or the alimentary canal. The organs that fit together to form this system include:

18. the mouth,

19. the pharynx,

20. the esophagus,

21. the stomach,

22. and the intestines.

23. Accessory organs assist the organs of digestion with their functions. They include:

24. the teeth,

25. the salivary glands,

26. the liver,

27. the gallbladder,

28. the pancreas,

29. and the vermiform appendix.

30. The entire digestive system is comprised of four different layers of tissue.

31. A mucous layer lines the inside of the digestive tube.

32. A connective tissue layer containing blood vessels lies outside the mucous lining.

33. A muscular layer lies outside the connective tissue.

34. And, finally, a serous layer called the peritoneum surrounds the outside of the tube. The characteristics of these tissue layers vary from organ to organ.

35. For example, the mucous lining of the stomach has many folds called rugae.

36. Also, the mucous lining of the small intestines has many microscopic projections called villi.

37. Another structure comprised of serous membrane is the peritoneum. It lines the walls of the abdominal and pelvic cavities. Folds of the peritoneum which support the intestines is called the mesentery. The mesentery is a thin fan-like structure. It originated in the lumbar area and attaches to the small intestine at the wide end.

38. The mesenteric function is to suspend the small intestine and carry the blood and nerve supply.

39. Another large fold of peritoneum is the greater omentum. It has an apron-like appearance that attaches to the lower edge of the stomach and upper intestine and hangs loosely over these organs.

40. The greater omentum functions during injuries to envelope the injuries and wall off the inflamed areas.

41. The lesser omentum is another portion of the peritoneum. It originates at the upper surface of the stomach and extends to the liver.

42. In the final section of this module, the major points presented will be summarized.

43. The digestive system prepares food for absorption and eliminates waste.

44. Organs that comprise the digestive system are: the mouth, pharynx, esophagus, stomach, and the intestines.

45. Accessory organs that aid in the digestive process are: the teeth, salivary glands, liver, gallbladder, pancreas, and vermiform appendix.

46. The structure of the wall of the alimentary canal is composed of four layers of tissue and the characteristics of these layers vary from organ to organ.

47. In the next module of this unit, you will study the buccal cavity which is the upper part of the GI tract.

48. (CREDITS)

49. (DISCLAIMER)

50. This is the end of this presentation. Please rewind the tape and return this module to the proper storage area.

HO-R83-502
Student Learning Materials

MEDIA CENTER

STATE FAIR COMMUNITY COLLEGE

1900 CLARENDON ROAD

SEDALIA, MO 65301

Health Occupations

500 Body Structure and Function

02 The Buccal Cavity

Date Started ____________

Student ____________________________ Date Completed ____________

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INTRODUCTION

In the last lesson component parts of the digestive system were identified. This lesson begins a series of lessons that will take a much closer look at each of these structures and their respective roles. This first lesson in the series concerns the buccal cavity, or mouth, which begins the entire digestive process. You will be able to apply this information to future lessons on digestion and in medical-surgical nursing. But more important is the fact that this information is related to nursing care administered to patients every day, since most patients eat three meals a day and all patients need daily oral hygiene.

OBJECTIVES

Following completion of this module the student should be able to:

1. Differentiate among the component parts of the mouth and their characteristics.
2. Recall the functions of the mouth.
3. Distinguish deciduous and permanent dentitions.
4. Recognize the component parts of the "typical" tooth.
5. Name and locate the salivary glands.
6. Recall the secretions present is saliva and their functions.

INFORMATIONAL ASSIGNMENT

Read one of the following:

Anthony, Catherine and Alyn, Irene; Structure and Function of Body, pp. 102-103, C. V. Mosby Co., 1976.

Memmler, Ruth and Rada, Ruth; Structure and Function of the Human Body, pp. 148-150, J. B. Lippincott Co., 1970.

Tortoro, Gerald J., and Anagnostakos, Nicholas P., Principles of Anatomy and Physiology, pp. 600-608, Harper and Row 1981.

The section pertaining to the buccal cavity in your particular text.

PROCEDURE

1. Review the objectives for this module.
2. Read the information assignment.
3. Obtain the slide/tape presentation.
4. Turn to page 3, the information sheet, and proceed through the slide/tape presentation jotting down notes as necessary.
5. Complete the activity assignment.
6. Refer back to the objectives to be sure they have been met.
7. Check with your instructor prior to completing the post-test and proceeding to the next module.

INFORMATION SHEET

The mouth is formed by the cheeks, tongue, hard palate, and soft palate.

The hard palate forms the front part of the roof of the mouth.

The hard palate separates the nasal cavity from the oral cavity.

The hard palate is formed by the maxilla and palatine bones.

The soft palate extends from the posterior of the hard palate, forming the back part of the roof of the oral cavity.

The soft palate separates the nasal pharynx from the oral cavity.

The soft palate is composed of muscle and mucous membranes which form an arch in the back of the oral cavity.

Suspended from this arch is a small piece of tissue called the uvula.

The tongue is a structure composed of skeletal muscle and covered with a mucous membrane. The tongue forms the floor of the oral cavity.

Three kinds of rough elevations called papillae can be found on the tongue.

The largest papillae are the circumvalate papillae.

These circumvalate papillae can be seen on the posterior part of the tongue forming the letter "V".

A second type of papillae are the filiform papillae.

The name filiform comes from their tall thread-like or filament appearance.

The third type of papillae are the fungi-form papillae.

The name fungi-form comes from their mushroom-type shapes.

The red color of these papillae makes them more prominent at various times.

Nerve endings which form taste buds are found on the papillae.

The frenulum is the mucous membrane fold between the tongue and the floor of the mouth. It helps to anchor the tongue to the floor of the mouth.

The mouth has three major functions: receive food, prepare food initially for the digestive process, and aid in speech.

Teeth are accessory organs associated with the mouth. They're used for chewing, also called mastication.

We have two sets of teeth in a lifetime. Dentition refers to the number, type, and arrangement of these teeth.

The first set contains 20 teeth and is called the deciduous teeth. Lay names also include baby teeth and milk teeth.

The second and last set contain 32 teeth. They are called permanent teeth. Our discussion begins with the composition of permanent teeth.

There are two pair of incisors, the central incisors and lateral incisors.

Beside the incisors are the cuspid or canine teeth.

Following these are the first and second premolars.

The last teeth that comprise the permanent dentition are the first, second, and third molars.

The arrangement of deciduous teeth is the same as that of permanent teeth with two exceptions.

The deciduous set does not include premolars nor the third pair of molars.

The functions of teeth are as follows: incisors help in mastication by cutting the food we eat, cuspid or canine teeth help by tearing our food, and molars are used for grinding our food.

The structure of all teeth is basically the same. The pulp is the central part of the tooth that is composed of connective tissue. It contains nerves and blood vessels.

The dentine forms the body of the tooth.

The enamel is a highly calcified connective tissue on the outside of the tooth. It covers all the grinding surfaces of the teeth.

The crown is the exposed part of the tooth that is covered with enamel.

The periodontal membrane lines the tooth socket.

Cementum is a connective tissue that holds the tooth in the socket.

The root is the part of the tooth that fits into the socket.

The gum is also called the gingiva.

Other accessory organs associated with the mouth include three salivary glands on each side of the face--or three parts.

The largest pair of glands is the parotid glands. These glands are located in front of the lower part of each ear.

The ducts from the parotid glands open on the inside of the cheek opposite the upper second molar.

A second pair of glands is located on the posterior part of the floor of the mouth. These glands are called either submandibular or submaxillary glands.

The ducts from these glands open beside the frenulum.

The smallest pair of glands is located in the floor of the mouth by the frenulum. They are called sublingual glands.

These glands have several ducts which open into the floor of the mouth.

The function of the salivary glands is the production of saliva.

The salivary glands secrete 1000 to 1500 milliliters of saliva each day.

Saliva is composed of ptyalin, an enzyme which digests starches, and mucus, which moistens and helps hold chewed food together for swallowing.

The production of saliva is affected by the following stimuli to the brain: chemical, mechanical, olfactory, and visual.

In the final section of this module, the major points presented will be summarized.

The mouth is formed by the cheeks, tongue, hard palate, and soft palate.

The functions of the mouth are to receive food, prepare food initially for the digestive process, and to aid in speech.

Each individual has two sets if teeth in a lifetime. Twenty teeth are contained in the deciduous or baby set whereas there are 32 teeth in the permanent set.

The component parts of a typical tooth are the pulp, dentine, enamel, peridontal membrane, root, cementum, crown, and gum.

Three pair of salivary glands called the parotid, submaxillary, and sublingual are accessory organs to the mouth.

These glands secrete saliva which contains ptyalin and mucus.

HO-R83-502

ACTIVITY SHEET

1. Name the four component parts of the mouth. ____________________

____

2. Where is the hard palate located? ____________________

____

3. What two cavities does the hard palate separate? ____________________

____

4. Where is the soft palate located and what does it form? ____________

____

____

5. The soft palate is composed of muscle and mucous membrane which form an arch in the back of the oral cavity. The tissue suspended from this arch is called the ______________________________.

6. What are the three types of papillae found on the tongue? ____________

____

7. What is found on the papillae? ____________________

____

8. What are the three major functions of the mouth? ____________________

____

____

9. Teeth are accessory organs associated with the mouth. The first set of teeth are called ________________, ________________, or ______ and contain ______ teeth. The second set are called ______________ teeth and contain ______ teeth.

10. What are the component parts of a typical tooth?
    a. ____________________________________
    b. ____________________________________
    c. ____________________________________
    d. ____________________________________

e. ______________________________

f. ______________________________

11. What are the names and locations of the salivary glands?

a. ______________________________

b. ______________________________

c. ______________________________

12. What is the function of the salivary glands? ______________________________

____

13. What secretions are present in saliva and what are their functions?

a. ______________________________

b. ______________________________

Activities

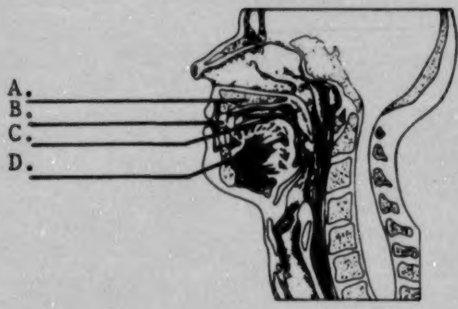
1. Locate the parts of the mouth, teeth and salivary glands on available charts and/or models.

2. Label the diagrams of the mouth, a "typical" tooth and dentition found in the student packet.

3. Using a mirror, examine your buccal cavity locating the uvula, circumvallate papillae, filiform papillae, fungiform papillae, frenulum, ducts of salivary glands, incisors, cuspids, pre-molars, and molars.

ACTIVITY SHEET

Mouth



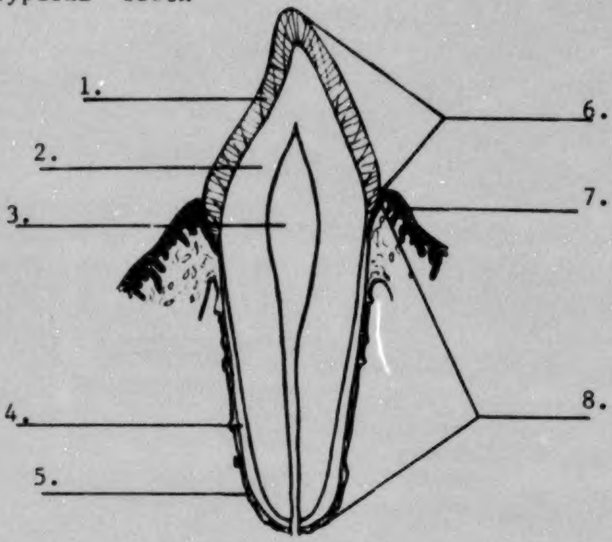
A. ________________________________

B. ________________________________

C. ________________________________

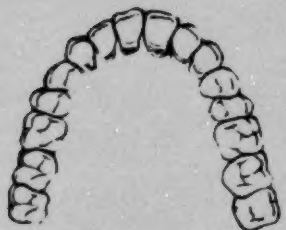
D. ________________________________

"Typical" tooth



1. ________________________________
2. ________________________________
3. ________________________________
4. ________________________________
5. ________________________________
6. ________________________________
7. ________________________________
8. ________________________________

Dentition



a. ________________________________

b. ________________________________

c. ________________________________

d. ________________________________

e. ________________________________

f. ________________________________

g. ________________________________

h. ________________________________

HO-R83-502

STUDENT EVALUATION

___Pre-test

___Post test Student ______________________

1. List the component parts of the mouth.
   a. ______________________
   b. ______________________
   c. ______________________
   d. ______________________

___ 2. The hard palate forms the front part of the roof of the mouth. T or F

___ 3. The hard palate separates the nasal cavity from the oral cavity. T or F

___ 4. The soft palate separates the nasal pharynx from the oral cavity. T or F

___ 5. The uvula is suspended from the soft palate. T or F

6. List the functions of the mouth.
   a. ______________________________________
   b. ______________________________________
   c. ______________________________________

7. Differentiate between deciduous and permanent dentition.

	Deciduous	**Permanent**
Number of teeth		
Type		
Composition (teeth)		

8. Label the component parts of a typical tooth.

    1. ______________________________
    2. ______________________________
    3. ______________________________
    4. ______________________________
    5. ______________________________
    6. ______________________________
    7. ______________________________
    8. ______________________________

9. Name the salivary glands and give their location.

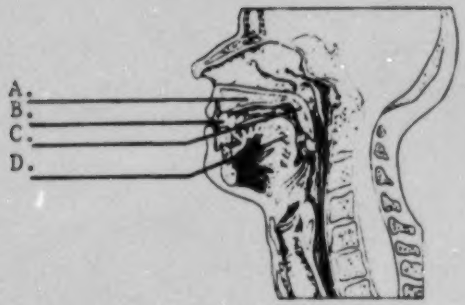
    a. ____
    b. ____
    c. ____

___ 10. Saliva contains an enzyme called

    a. maltose
    b. pepsin
    c. ptyalin
    d. trypsin

STUDENT EVALUATION

Mouth



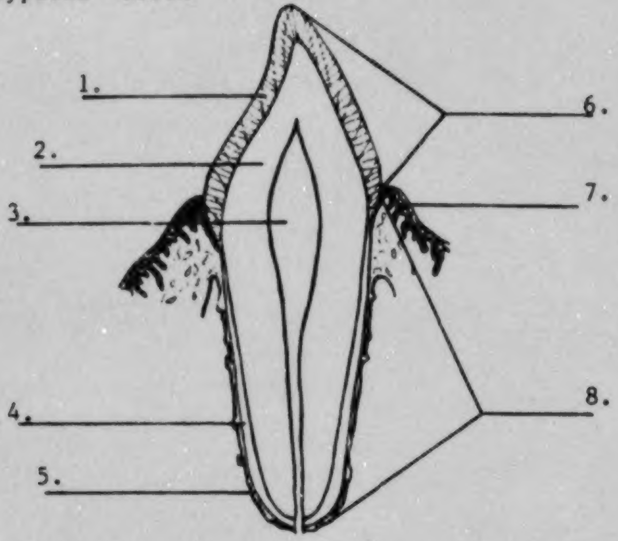
A.____________________________

B.____________________________

C.____________________________

D.____________________________

"Typical" tooth



1.____________________________

2.____________________________

3.____________________________

4.____________________________

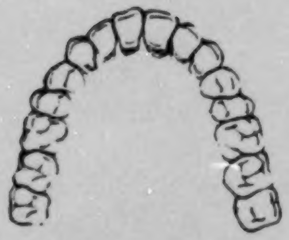
5.____________________________

6.____________________________

7.____________________________

8.____________________________

Dentition



a.____________________________

b.____________________________

c.____________________________

d.____________________________

e.____________________________

f.____________________________

g.____________________________

h.____________________________

LESSON PLAN # HO-R83-502

LESSON PLAN FORMAT

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # Gastrointestinal System

(UNIT TITLE)

SCOPE OF UNIT: Identify the component parts of the gastrointestinal system and explain how they fit together and function to choose nutrients necessary for the performance of body processes.

INFORMATION TOPIC # 502 OR DEMONSTRATION #

THE BUCCAL CAVITY

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

1. Differentiate the component parts of the mouth and their characteristics.
2. Recall the functions of the mouth.
3. Distinguish deciduous and permanent dentition.
4. Recognize the component parts of a "typical" tooth.
5. Name and locate the salivary glands.
6. Recall the secretions present in saliva and their functions.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Slide/tape series "The Buccal Cavity"
2. Slide projector
3. Screen
4. Tape player
5. Individualized instruction modules
6. Anatomical models or charts of the mouth and teeth, as available.

	(Name)	(Date)	Special Learning Features For:
Written By:	D. Hathaway	3-78	
Revised	A. Young	2-83	
Instructional Delivery System By:			

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INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

1. Slide/tape series "The Buccal Cavity."
2. Student information packet "The Buccal Cavity."
3. One of the following or similar information in student's text:
    a. Anthony, Catherine and Alyn, Irene, Structure and Function of the Body, pp. 102-103, C. B. Mosby Co. 1976.
    b. Memmler, Ruth and Rada, Ruth, Structure and Function of the Human Body, pp. 148-150, J. B. Lippincott Co. 1970.
    c. Tortoro, Gerald J., and Anagnostakos, Nicholas P., Principles of Anatomy and Physiology, pp. 600-608, Harper and Row 1981.

REFERENCES: (BIBLIOGRAPHY DATA)

In addition to the above:

1. Anthony, Catherine and Kolthaff, Norma, Textbook of Anatomy Physiology, C. V. Mosby Co. 1971.
2. Gray, Henry; Goss, Charles (Ed.) Anatomy of the Human Body, Lea and Febiger, 1974.
3. Guyton, Arthru, Textbook of Medical Physiology, W. B. Saunders Co. 1976.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In the last lesson component parts of the digestive system were identified. This lesson begins a series of lessons that will take a much closer look at each of these structures and their respective roles. This first lesson in the series concerns the buccal cavity, or mouth, which begins the entire digestive process. You will be able to apply this information to future lessons on digestion and in medical-surgical nursing. But more important is the fact that this information is related to nursing care administered to patients everyday, since most patients eat three meals a day and all patients need daily oral hygiene.

LESSON PLAN # HO-R83-502

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 502 — Gastrointestinal System
(Unit or Block Title)

INFORMATION TOPIC # 502 (Technical - General - Guidance)

TITLE: The Buccal Cavity

OUTLINE:

- I. The mouth is formed by the cheeks, tongue, hard palate and soft palate.
  - A. Hard palate
    - 1. Front part of roof of mouth
    - 2. Separates nasal and oral cavities
    - 3. Composed of bone II #1
      - a. Palatine
      - b. Maxilla
  - B. Soft palate
    - 1. Back part of roof of mouth II #2
    - 2. Separates nasopharynx and mouth
    - 3. Composed of muscle
    - 4. Uvula
  - C. Tongue II #3
    - 1. Composed of skeletal muscle
    - 2. Covered with mucous membrane
    - 3. Forms the floor of the oral cavity
    - 4. Has rough elevations called papillae
      - a. Circumvallate
        - i. Are large (4-2mm)
        - ii. Are in a row that forms a V
        - iii. Found on posterior part of tongue
      - b. Filiform
        - i. Threadlike
        - ii. Tall and narrow
      - c. Fungiform
        - i. Have a "mushroom-type" shape
        - ii. Have a deep red color II #4
      - d. Papillae contain nerve endings which form tast buds.
    - 5. Frenulum is the mucous fold between the tongue and floor of the mouth.
  - D. Functions of the mouth II #5
    - 1. Receive food
    - 2. Prepare food initially for the digestive process
      - a. chewing - mastication
      - b. swallowing - deglutition
    - 3. Aid in speech

II. Teeth
  A. Dentition
    1. Are two sets of teeth in a lifetime II #6,7
      a. 20 deciduous or "baby teeth" or "milk teeth"
      b. 32 permanent teeth
    2. Arrangement of teeth from front to back (permanent)
      a. Central incisor
      b. Lateral incisor
      c. Cuspid or canine II #8 (eye)
      d. First pre-molar
      e. Second pre-molar
      f. First molar
      g. Second molar
      h. Third molar II #9 (wisdom)
    3. Arrangement of deciduous teeth is same as permanent except
      a. Are no pre-molars
      b. Are only two molars (no wisdom teeth)
    4. Function of teeth
      a. Cutting, done with incisors
      b. Tearing, done with cuspids (or canine)
      c. Grinding, done with molars
  B. Structure of teeth
    1. Pulp
      a. Central connective tissue
      b. Conveys blood vessels and nerves
    2. Dentine forms the body of the tooth
    3. Enamel
      a. Highly calcified connective tissue
      b. Covers grinding surfaces
    4. Crown is part of tooth with enamel
    5. Periodontal membrane lines the tooth socket
    6. Cementum
      a. Connective tissue
      b. Holds tooth in socket
    7. Root, part of tooth fitting into the socket
    8. Gingiva is the gum

III. Salivary glands
  A. Three glands on each side of the face (3 pairs)
    1. Parotid
      a. Largest
      b. In front of lower part of ear
      c. Is inflamed with mumps (parotitis)
      d. Duct opens on oral surface of cheek opposite the second molar
    2. Submandibular or submaxillary
      a. Located on the posterior part of the floor of the mouth
      b. Duct opens by the frenulum II #10
    3. Sublingual
      a. Smallest
      b. Located in floor of mouth beside the frenulum
      c. Several ducts open into the floor of the mouth
  B. Salivary glands produce saliva
    1. Secretes 1000-1500 milliliters per day

2. Contains two types of secretions
   a. Ptyalin, an enzyme for digesting starches
   b. Mucous, to moisten and hold chewed food together for swallowing

C. The production of saliva is affected by the following stimuli to the brain
   1. Chemical
   2. Mechanical
   3. Olfactory
   4. Visual II #11

IV. Summary and conclusion
   A. The mouth is formed by the cheeks, tongue, hard palate, and soft palate.
   B. The functions of the mouth are to receive food, prepare food initially for the digestive process, and to aid in speech.
   C. Each individual has two sets of teeth in a lifetime. Twenty teeth are contained in the deciduous or baby set whereas there are 32 teeth in the permanent set.
   D. The component parts of a typical tooth are the pulp, dentine, enamel, peridontal membrane, root, cementum, crown, and gum.
   E. Three pair of salivary glands called the parotid, submaxillary, and sublingual are accessory organs to the mouth.
   F. These glands secrete saliva which contains ptyalin and mucus.
   G. In the next module we will learn about the pharynx, esophagus, and stomach.

LESSON PLAN # 502

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 502 — Gastrointestinal System
(Unit Title)

INFORMATION TOPIC # 502 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Recalling the unit on the skeletal system, what bones do you think form the hard palate?
2. The soft palate separates the mouth from what part of the respiratory system?
3. Is the tongue smooth, skeletal, or cardiac muscle?
4. What purpose do you think papillae have?
5. What functions might the mouth have?
6. What names are often given the first set of teeth?
7. How many teeth are in the first set? The second set?
8. Do you know still another name for the cuspid or canine tooth? (eye teeth)
9. What is another name for the third molar? (wisdom)
10. What is the frenulum?
11. What are the four types of stimuli that affect the production of saliva; give an example of each.

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Locate the parts of the mouth, teeth and salivary glands on available charts and/or models.
2. Label the diagrams of the mouth, a "typical" tooth, and dentition found in the student packet.
3. Using a mirror, examine your buccal cavity, locating the uvula, circimvallate papillae,filiform papillae, fungiform papillae, frenulum, ducts of salivary glands, incisors, cuspids, pre-molars, and molars.

LESSON PLAN # 502

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 502 — Gastrointestinal System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

(See Student Evaluation)

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ACTIVITY SHEET
KEY

1. Name the four component parts of the mouth.

   Cheeks, tongue, hard palate, and soft palate

2. Where is the hard palate located?

   It forms the front part of the roof of the mouth.

3. What two cavities does the hard palate separate?

   Nasal and oral

4. Where is the soft palate located and what does it form? It extends from the posterior of the hard palate and forms the back part of the roof of the oral cavity.

5. The soft palate is composed of muscle and mucous membrane which form an arch in the back of the oral cavity. The tissue suspended from this arch is called the uvula.

6. What are the three types of papillae found on the tongue?

   Circumvalate, filiform, fungi-form

7. What is found on the papillae?

   Nerve endings which form taste buds

8. What are the three major functions of the mouth?

   Receive food, prepare food initially for the digestive process, and aid in speech

9. Teeth are accessory organs associated with the mouth. The first set of teeth are called deciduous, baby, or milk and contain 20 teeth. The second set are called permanent teeth and contain 32 teeth.

10. What are the component parts of a typical tooth?
    a. Enamel - outside of the tooth
    b. Crown - the exposed part
    c. Peridontal membrane - lines the tooth socket
    d. Cementum - holds the tooth in the socket

e. Root - that part of the tooth that fits into the socket

f. Gingiva

11. What are the names and locations of the salivary glands?
    a. Parotid - in front of the lower part of each ear
    b. Submandibular or Submaxillary - posterior part of the floor of the mouth
    c. Sublingual - in the floor of the mouth by the frenulum

12. What is the function of the salivary glands?

    Secrete saliva

13. What secretions are present in saliva and what are their functions?
    a. Ptyalin - an enzyme which digests starches
    b. Mucus - moistens and helps hold chewed food together for swallowing

Activities

1. Locate the parts of the mouth, teeth and salivary glands on available charts and/or models.

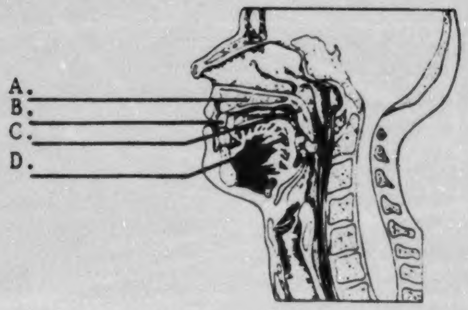
2. Label the diagrams of the mouth, a "typical" tooth and dentition found in the student packet.

3. Using a mirror, examine your buccal cavity locating the uvula, circumvallate papillae, filiform papillae, fungiform papillae, frenulum, ducts of salivary glands, incisors, cuspids, pre-molars, and molars.

HO-R83-502

ACTIVITY SHEET
KEY

Mouth



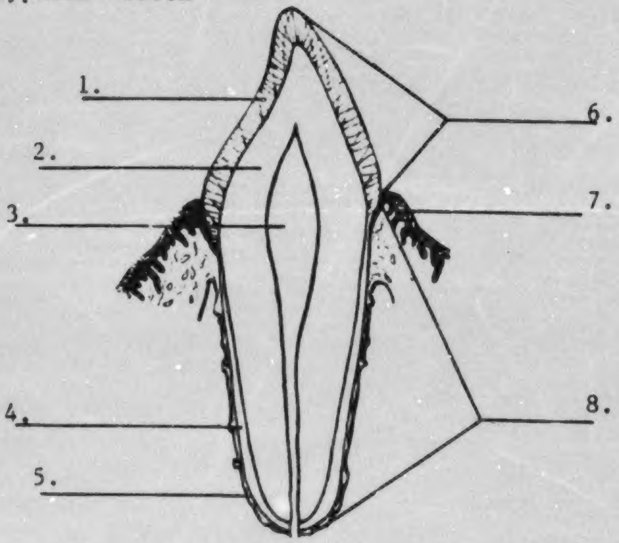
A. Hard palate

B. Teeth

C. Soft palate

D. Tongue

"Typical" tooth



1. Enamel

2. Dentine

3. Pulp

4. Periodontal Membrane

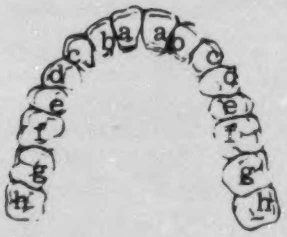
5. Cementum

6. Crown

7. Gingiva

8. Root

Dentition



a. Central incisor

b. Lateral incisor

c. Cuspid or canine

d. First premolar

e. Second premolar

f. First molar

g. Second molar

h. Third molar

HO-R83-502

STUDENT EVALUATION
KEY

___Pre-test

___Post test

Student ______________________

1. List the component parts of the mouth.
   a. Cheeks
   b. Tongue
   c. Hard palate
   d. Soft palate

T 2. The hard palate forms the front part of the roof of the mouth. T or F

T 3. The hard palate separates the nasal cavity from the oral cavity. T or F

T 4. The soft palate separates the nasal pharynx from the oral cavity. T or F

T 5. The uvula is suspended from the soft palate. T or F

6. List the functions of the mouth.
   a. Receive food
   b. Prepare food initially for the digestive process
   c. Aid in speech

7. Differentiate between deciduous and permanent dentition.

	Deciduous	Permanent
Number of teeth	20	32
Type	Baby	Permanent
Composition (teeth)	2 pair incisors (central & lateral) cuspid or canine first & second molars	2 pair incisors (central & lateral) cuspid or canine first & second premolars first, second, & third molars

8. Label the component parts of a typical tooth.
   1. Pulp
   2. Dentine
   3. Enamel
   4. Periodontal membrane
   5. Root
   6. Cementum
   7. Crown
   8. Gingiva

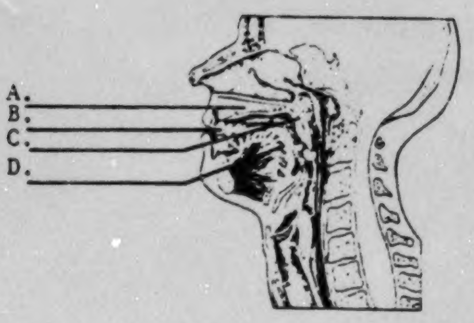
9. Name the salivary glands and give their location.
   a. Parotid - in front of the lower part of each ear
                                                  posterior part of the
   b. Submandibular or Submaxillary - floor of the mouth
   c. Sublingual - in the floor of the mouth by the frenulum

C 10. Saliva contains an enzyme called
   a. maltose
   b. pepsin
   c. ptyalin
   d. trypsin

HO-R83-502

STUDENT EVALUATION
KEY

Mouth



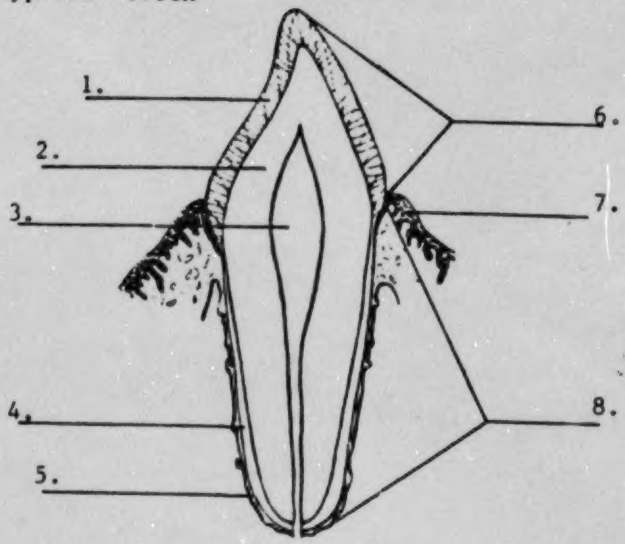
A. Hard palate

B. Teeth

C. Soft palate

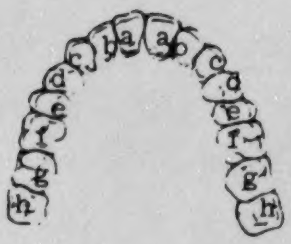
D. Tongue

"Typical" tooth



1. Enamel
2. Dentine
3. Pulp
4. Periodontal Membrane
5. Cementum
6. Crown
7. Gingiva
8. Root

Dentition



a. Central incisor

b. Lateral incisor

c. Cuspid or canine

d. First premolar

e. Second premolar

f. First molar

g. Second molar

h. Third molar

HO-R83-502 THE BUCCAL CAVITY - SCRIPT

1. A presentation of The Media Center, State Fair Community College, Sedalia, Missouri.

2. HO-R83-502 THE BUCCAL CAVITY is the second module in the Gastrointestinal Unit for the course Body Structure and Function.

3. In this module you will learn about the Buccal Cavity, or mouth, which begins the digestive process.

4. After completing this module, you should be able to: (1) Differentiate the component parts of the mouth and their characteristics.

5. (2) Recall the functions of the mouth.

6. (3) Distinguish deciduous and permanent dentition.

7. (4) Recognize the component parts of a "typical" tooth.

8. (5) Name and locate the salivary glands.

9. (6) Recall the secretions present in saliva and their functions.

10. The mouth is formed by the cheeks, tongue, hard palate, and soft palate.

11. The hard palate forms the front part of the roof of the mouth.

12. The hard palate separates the nasal cavity from the oral cavity.

13. The hard palate is formed by the maxilla and palatine bones.

14. The soft palate extends from the posterior of the hard palate, forming the back part of the roof of the oral cavity.

15. The soft palate separates the nasal pharynx from the oral cavity.

16. The soft palate is composed of muscle and mucous membranes which form an arch in the back of the oral cavity.

17. Suspended from this arch is a small piece of tissue called the uvula.

18. The tongue is a structure composed of skeletal muscle and covered with a mucous membrane. The tongue forms the floor of the oral cavity.

19. Three kinds of rough elevations called papillae can be found on the tongue.

20. The largest papillae are the circumvallate papillae.

21. These circumvallate papillae can be seen on the posterior part of the tongue forming the letter "V".

22. A second type of papillae are the filiform papillae.

23. The name filiform comes from their tall thread-like or filament appearance.

24. The third type of papillae are the fungi-form papillae.

25. The name fungi-form comes from their mushroom-type shapes.

26. The red color of these papillae makes them more prominent at various times.

27. Nerve endings which form taste buds are found on the papillae.

28. The frenulum is the mucous membrane fold between the tongue and the floor of the mouth. It helps to anchor the tongue to the floor of the mouth.

29. The mouth has three major functions: (1) Receive food. (2) Prepare food initially for the digestive process. (3) Aid in speech.

30. Teeth are accessory organs associated with the mouth. They're used for chewing, also called mastication.

31. We have two sets of teeth in a lifetime. Dentition refers to the number, type, and arrangement of these teeth.

32. The first set contains 20 teeth and is called the deciduous teeth. Lay names also include baby teeth and milk teeth.

33. The second and last set contain 32 teeth. They are called permanent teeth. Our discussion begins with the composition of permanent teeth.

34. There are two pair of incisors, the central incisors and lateral incisors.

35. Beside the incisors are the cuspid or canine teeth.

36. Following these are the first and second premolars.

37. The last teeth that comprise the permanent dentition are the first, second, and third molars.

38. The arrangement of deciduous teeth is the same as that of permanent teeth with two exceptions.

39. The deciduous set does not include premolars nor the third pair of molars.

40. The functions of teeth are as follows: (1) Incisors help in mastication by cutting the food we eat.

41. (2) Cuspid or canine teeth help by tearing our food.

42. (3) Molars are used for grinding our food.

43. The structure of all teeth is basically the same. The pulp is the central part of the tooth that is composed of connective tissue. It contains nerves and blood vessels.

44. The dentine forms the body of the tooth.

45. The enamel is a highly calcified connective tissue on the outside of the tooth. It covers all the grinding surfaces of the teeth.

46. The crown is the exposed part of the tooth that is covered with enamel.

47. The periodontal membrane lines the tooth socket.

48. Cementum is a connective tissue that holds the tooth in the socket.

49. The root is the part of the tooth that fits into the socket.

50. The gum is also called the gingiva.

51. Other accessory organs associated with the mouth include three salivary glands on each side of the face--or three pairs.

52. The largest pair of glands is the parotid glands. These glands are located in front of the lower part of each ear.

53. The ducts from the parotid glands open on the inside of the cheek opposite the upper second molar.

54. A second pair of glands is located on the posterior part of the floor of the mouth. These glands are called either submandibular or submaxillary glands.

55. The ducts from these glands open beside the frenulum.

56. The smallest pair of glands is located in the floor of the mouth by the frenulum. They are called sublingual glands.

57. These glands have several ducts which open into the floor of the mouth.

58. The function of the salivary glands is the production of saliva. The salivary glands secrete 1000 to 1500 milliliters of saliva each day.

59. Saliva is composed of ptyalin, an enzyme which digests starches, and mucus, which moistens and helps hold chewed food together for swallowing.

60. The production of saliva is affected by the following stimuli to the brain: chemical, mechanical, olfactory, and visual.

61. In the final section of this module, the major points presented will be summarized.

62. The mouth is formed by the cheeks, tongue, hard palate, and soft palate.

63. The functions of the mouth are to receive food, prepare food initially for the digestive process, and to aid in speech.

64. Each individual has two sets of teeth in a lifetime. Twenty teeth are contained in the deciduous or baby set whereas there are 32 teeth in the permanent set.

65. The component parts of a typical tooth are the pulp, dentine, enamel, peridontal membrane, root, cementum, crown, and gum.

66. Three pair of salivary glands called the parotid, submaxillary, and sublingual are accessory organs to the mouth.

67. These glands secrete saliva which contains ptyalin and mucus.

68. In the next module of this unit, you will study the mechanics of swallowing and progress further along the digestive system to the pharynx, esophagus, and stomach.

69. (CREDITS)

70. (DISCLAIMER)

71. This is the end of this presentation. Please rewind the tape and return this module to the proper storage area.

HO-R83-503
Student Learning Materials

MEDIA CENTER

STATE FAIR COMMUNITY COLLEGE

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Health Occupations

500 Body Structure and Function

03 Gastrointestinal System

Date Started ________

Student ______________________________ Date Completed ________

Approved ________

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Missouri Department of Elementary

and Secondary Education

INTRODUCTION

In the previous lesson we looked at the structure and function of the buccal cavity. In this lesson we will advance along the digestive tract and explore the process of deglutition (or swallowing), the role of the esophagus and the structure and function of the stomach. Knowledge of these topics will give you valuable information that can not only be applied to our daily consumption of food, but it also lays the foundation for several common disorders that you will encounter during your experience as a nurse.

OBJECTIVES

Following completion of this module the student should be able to:

1. Recognize the role of the pharynx and esophagus in relation to swallowing
2. Identify the component parts of the stomach
3. Differentiate the roles of the cardiac and pyloric sphincters
4. Distinguish the secreting cells of the stomach by identifying their secretions
5. Recall the functions carried out by the stomach

INFORMATIONAL ASSIGNMENT

Read one of the following:

Anthony, Catherine and Norma, Kolthoff, Textbook of Anatomy and Physiology, pp. 391-396, C. V. Mosby Co. 1975.

Memmler, Ruth and Rada, Ruth, Structure and Function of the Human Body, pp. 150-151, J. B. Lippincott Co. 1970.

Tortora, Garold J. and Agnagnostakos, Nicholas P., Principles of Anatomy and Physiology, pp. 608-614, Harper and Row 1981.

The section in your text pertaining to the pharynx, esophagus, and the stomach.

PROCEDURE

1. Review the objectives for this module
2. Read the information assignment
3. Obtain the slide/tape presentation
4. Turn to page 3, the information sheet, and proceed through the slide/tape presentation jotting down notes as necessary
5. Complete the activity assignment
6. Refer back to the objectives to be sure they have been met
7. Check with your instructor prior to completing the post test and proceeding to the next module

INFORMATION SHEET

The pharynx is the part of the digestive system more commonly referred to as the throat. It is a tubelike structure about five inches long that extends from the base of the skull to the esophagus. It is made of muscle, lined with mucous membrane, and has three parts.

The nasopharynx is that part located behind the nose.

The oropharynx is in the area behind the mouth.

The laryngopharynx is that part located behind the larynx.

The pharynx serves a dual purpose--it serves as a passageway for food as well as an airway.

The pharynx usually functions as part of the respiratory system.

However, it is converted for a few seconds during swallowing into a tract for the propulsion of food. It also assists other structures in phonation or speech.

Food passes from the mouth into the pharynx. Movement of food becomes involuntary after it is swallowed. Alternate contraction and relaxation of the smooth or involuntary muscles, called peristalsis, push the food onward in the digestive tract.

From the pharynx, food passes to the esophagus. The esophagus is a muscular, collapsible tube about ten inches long that serves as a passageway from the pharynx to the stomach.

The esophagus lies immediately behind the trachea and also goes behind the heart as it descends into the thoracic cavity.

The esophagus pierces, or goes through, the diaphragm just before it joins the stomach.

There are three stages of swallowing. The first stage is the voluntary stage. This initiates the process and occurs when the tongue forces food into the pharynx.

The second stage of swallowing is the pharyngeal stage. From this point on, the process of swallowing is almost entirely automatic. During this stage, the trachea closes and the esophagus opens due to the action of the epiglottis and vocal cords.

Peristaltic waves then begin in the pharynx and force food into the esophagus, completing this phase of swallowing in one to two seconds.

The last stage of swallowing is the esophageal stage. During this stage, food is transported through the esophagus from the pharynx to the stomach by peristaltic waves which is completed in four to eight seconds.

As the esophagus goes through the diaphragm, it expands into another of the digestive organs, the stomach.

The stomach has three divisions. The upper part is called the fundus, the middle part the body, and the lower part the pylorus.

The stomach has two curves. The lesser curve is on the upper right side of the stomach and is the smaller of the two curves. The greater curve is on the lower left side and is the larger of the two curves.

Circular muscles called sphincters guard both openings of the stomach. The cardiac sphincter is at the top of the stomach. It is named cardiac since it is close to the heart.

This sphincter prevents reflux into the esophagus. If gastric acid should get into the esophagus, it causes heartburn.

The pyloric sphincter is at the bottom of the pyloric part of the stomach. This sphincter holds food in the stomach so it can be partially digested.

Peristaltic waves of the stomach gradually force small amounts of food into the intestine at intervals.

The smooth muscle layer of the stomach wall varies from the muscular layer of the rest of the digestive system. It is composed of three muscle layers instead of the usual two, making it one of the strongest internal organs.

The mucous lining of the stomach falls in folds called rugae when the stomach is empty.

There are many modifications in the mucosa of the stomach which aid in digestion.

Epithelial cells secrete mucus that contains an intrinsic factor which causes the absorption of Vitamin B_{12}.

Parietal cells secrete hydrochloric acid.

Chief cells secrete gastric juice enzymes.

The stomach has four main functions which are explained in the next four slides.

It serves as a reservoir to store food until it can be partially digested and moved on.

The stomach secretes mucus, hydrochloric acid, and enzymes to help digest food. It also secretes intrinsic factor.

Through contraction, the stomach partially digests food by breaking it into smaller pieces and mixing food with gastric secretions before moving it onward.

The stomach carries on a limited absorption of water, alcohol, and some drugs.

In the final section of this module, the major points presented will be summarized.

The pharynx and esophagus are key structures in deglutition or swallowing.

The stomach has three divisions, the fundus, body, and the pylorus.

The cardiac and pyloric sphincters guard both openings of the stomach.

Three sets of secretory cells--epithelial, parietal, and chief--have been identified in this module.

The functions of the stomach are: it serves as a reservoir for food, it secretes mucus, hydrochloric acid, enzymes, and intrinsic factor, it digests foods partially, and it carries on limited absorption.

HO-R83-503

ACTIVITY SHEET

INTERACTION ITEMS

1. The pharynx is often considered a part of what other body system? ______

____

2. What are the three parts of the pharynx and what is their location?
   a. ____
   b. ____
   c. ____

3. There are three stages of swallowing. What are they called and describe each.
   a. ____

   ____

   b. ____

   ____

   c. ____

   ____

4. Where would you expect the body of the stomach to be? ______________

____

5. Where is the lesser curvature of the stomach? ______________

____

6. Where is the greater curvature of the stomach? ______________

____

7. Why do you suppose the cardiac sphincter was named so? ______________

____

8. Why do you think the pyloric sphincter was named so? ______________

____

9. Why does the stomach need to be so muscular? ______________

____

10. What do parietal cells secrete? ______________________________

____

11. What do chief cells secrete? ______________________________

____

12. What are the major functions of the stomach?

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

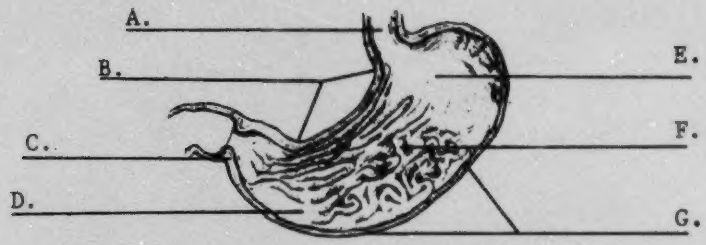
ACTIVITIES

1. Locate the pharynx, epiglottis, esophagus, trachea and component parts of the stomach on available charts and/or models.

2. Sketch a diagram of the stomach and label all divisions, curves and sphincters.

HO-R83-503

ACTIVITY SHEET



A. ____

B. ____

C. ____

D. ____

E. ____

F. ____

G. ____

HO-R83-503

STUDENT EVALUATION

___Pre-test

___Post test Name ______________________________

___ 1. During the pharyngeal stage of swallowing

1. the epiglottis closes
2. the tongue forces food into the pharynx
3. the esophagus opens
4. peristaltic waves begin in the pharynx and force food into the esophagus

a. 1,2,3
b. 1,3,4
c. 2,3,4
d. 1,2,4

___ 2. During the pharyngeal stage of swallowing

1. Food is transported through the esophagus from the pharynx to the stomach.
2. Food is moved by peristaltic waves.
3. It is the first stage of swallowing.
4. The stage lasts four to eight seconds.

a. 1,2,3
b. 1,3,4
c. 1,2,4
d. 1,2,3,4

3. The structure that prevents reflux of food from the stomach into the esophagus is the ______________ ______________.

4. The structure that holds food in the stomach until it is partially digested is the ______________ __________________.

5. Match the following gastric cells with their secretions.

___ epithelial cells	a. hydrochloric acid
___ parietal cells	b. mucous
___ chief cells	c. gastric enzymes

___ 6. The intrinsic factor allows for

a. storage of food
b. contractions of the stomach
c. absorption of vitamin B_{12}
d. absorption of water, alcohol and drugs

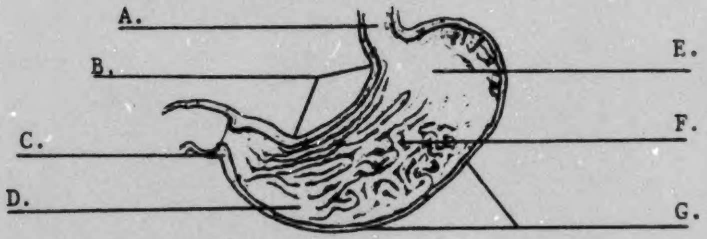
___ 7. The stomach

   a. secretes substances to help digest food
   b. partially digests food
   c. acts as a reservoir
   d. carries on limited absorption
   e. all of the above

8. Label the following diagram of the stomach.

HO-R83-503

STUDENT EVALUATION



A.____

B.____

C.____

D.____

E.____

F.____

G.____

LESSON PLAN # HO-R83-503

LESSON PLAN FORMAT

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 503 - Gastrointestinal System
(UNIT TITLE)

SCOPE OF UNIT: Identify the component parts of the gastrointestinal system and explain how they fit together and function to choose nutrients necessary for the performance of body processes.

INFORMATION TOPIC # 503 OR DEMONSTRATION # ________

The Pharynx, Esophagus, and Stomach

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

1. Recognize the role of the pharynx and esophagus in relation to swallowing.
2. Identify the component parts of the stomach.
3. Differentiate the roles of the cardiac and pyloric sphincter.
4. Distinguish the secreting cells of the stomach by identifying their secretion.
5. Recall the functions carried out by the stomach.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Slide/tape series "The Pharynx, Esophagus, and Stomach"
2. Slide projector
3. Screen
4. Tape player
5. Individualized instruction module
6. Anatomical models and/or charts of the pharynx, esophagus, and stomach as available.

	(Name)	(Date)	Special Learning Features For:
Written By:	D. Hathaway	3-78	
Revised	A. Young	2-83	
Instructional Delivery System By:			

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INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

1. Slide/tape series "The Pharynx, Esophagus, and Stomach"
2. Student information packet "The Pharynx, Esophagus, and Stomach"
3. One of the following or similar information in the student's text:
    a. Anthony, Catherine and Norma, Kolthoff, Textbook of Anatomy and Physiology, pp. 391-396, C. V. Mosby Co. 1975.
    b. Memmler, Ruth and Rada, Ruth, Structure and Function of the Human Body, pp. 150-151, J. B. Lippincott Co. 1970.
    c. Tortora, Garold J. and Agnagnostakos, Nicholas P., Principles of Anatomy and Physiology, pp. 608-614, Harper and Row 1981.

REFERENCES: (BIBLIOGRAPHY DATA)

In addition to the above:

1. Gray, Henry; Goss, Charles (Ed) Anatomy of the Human Body, Lea and Febiger, 1974.

2. Guyton, Arthur, Textbook of Medical Physiology, W. B. Saunders Co. 1976.

3. Thompson, Ella; Rosdahl, Caroline, Textbook of Basic Nursing, J. B. Lippincott Co. 1973.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In the previous lesson we looked at the structure and function of the buccal cavity. In this lesson we will advance along the digestive tract and explore the process of deglutition (or swallowing), the role of the esophagus and the structure and function of the stomach. Knowledge of these topics will give you valuable information that can not only be applied to our daily consumption of food, but it also lays the foundation for several common disorders that you will encounter during your experience as a nurse.

LESSON PLAN # 503

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 503 — Gastrointestinal System
(Unit or Block Title)

INFORMATION TOPIC # 503 (Technical - General - Guidance)

TITLE: The Pharynx, Esophagus, and Stomach

OUTLINE:

I. The Pharynx
  A. Commonly called the throat
  B. Extends from base of skull to esophagus
  C. Composed of muscle, lined with mucous membrane
  D. Composed of three parts
    1. Nasopharynx
    2. Oropharynx
    3. Laryngopharynx
  E. Functions
    1. Serves as passageway for
      a. Respiratory system - usually functions as a part of the respiratory system II #1
      b. Digestive system - converted for only a few seconds during swallowing into a tract for the propulsion of food.
    2. Aids in phonation
II. The Esophagus
  A. Collapsable tube about 10 inches long
  B. Lies behind the trachea and heart
  C. Serves as passageway from pharynx to stomach
  D. Pierces the diaphragm before joining the stomach
III. Deglutition (pharynx and esophagus)
  A. Swallowing is complicated mechanism
  B. Three stages of swallowing
    1. Voluntary state
      a. Initiates swallowing
      b. Tongue forces food into pharynx
    2. Pharyngeal stage
      a. Almost entirely automatic from here on
      b. Trachea closes II #2 (epiglottis and vocal cords close)
      c. Esophagus opens
      d. Peristaltic waves begin in pharynx, forcing food into the esophagus
      e. Entire process occurs in 1-2 seconds
    3. Esophageal stage
      a. Esophagus functions primarily to transport food from the pharynx to the stomach
      b. Peristaltic waves move food into the stomach in 4-8 seconds

IV. Stomach
- A. As esophagus goes through diaphragm, it expands into the stomach
- B. Stomach has three divisions
  - 1. Fundus-upper part
  - 2. Body-middle part II #3
  - 3. Pylorus-lower part
- C. Stomach has two curves
  - 1. Lesser curve II #4
    - a. Upper right side
    - b. On right
  - 2. Greater curve II #5
    - a. Lower left side
    - b. On left
- D. Sphincters guard both openings of the stomach
  - 1. Cardiac II #6
    - a. Prevents reflux into esophagus
    - b. Heartburn-gastric acid in esophagus
  - 2. Pyloric II #7
    - a. Holds food in stomach for partial digestion
    - b. Peristaltic waves of the stomach force it open at intervals
- E. Smooth muscle portion of stomach wall
  - 1. Composed of three layers
  - 2. One strongest internal organs II #8
- F. Mucous lining falls in folds (rugae) when stomach is empty
- G. Thousands of microscopic glands secrete substances into stomach
  - 1. Epithelial cells secrete mucous
    - a. Contains intrinsic factor
    - b. Factor allows absorption of B_{12}
    - c. B_{12} necessary for production of RBC's
  - 2. Parietal cells secrete hydrochloric acid
  - 3. Chief cells secrete gastric juice enzymes II #9
- H. Functions of the stomach
  - 1. Serves as reservoir to store food until it can be partially digested and moved on
  - 2. Secretes mucus, hydrochloric acid, and enzymes to help digest food. It also secretes intrinsic factor
  - 3. Through contractions it breaks food into smaller pieces and mixes it with gastric juices before moving it onward II #10
  - 4. Carries on limited absorption
    - a. Water
    - b. Alcohol
    - c. Some drugs

V. Summary and conclusion
- A. The pharynx and esophagus are key structures in deglutition or swallowing.
- B. The stomach has three divisions, the fundus, body, and the pylorus.
- C. The cardiac and pyloric sphincters guard both openings of the stomach.
- D. Three sets of secretory cells--epithelial, parietal, and chief--have been identified in this module.
- E. The functions of the stomach are: serves as a reservoir for food and secretes mucus, hydrochloric acid, enzymes, intrinsic factor, digests foods partially, and carries on limited absorption.
- F. In the following lesson we will look at the next portion of the GI tract, the intestines.

LESSON PLAN # 503

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 503 – Gastrointestinal System
(Unit Title)

INFORMATION TOPIC # 503 or DEMONSTRATION # ______

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. The pharynx is often considered a part of what other body system?
2. What structure separates the respiratory system from the digestive system?
3. Where would you expect the body of the stomach to be?
4. Where is the lesser curvature of the stomach?
5. Where is the greater curvature of the stomach?
6. Why do you suppose the cardiac sphincter was named so?
7. Why do you think the pyloric sphincter was named so?
8. Why does the stomach need to be so muscular?
9. What is the name of the cells that produce gastric juices?
10. What name has been given to the contractions that move food onward?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Locate the pharynx, epiglottis, esophagus, trachea and component parts of the stomach on available charts and/or models.
2. Sketch a diagram of the stomach and label all divisions, curves and sphincters.

LESSON PLAN # 503

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 503 — Gastrointestinal System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

(See Student Evaluation)

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HO-R83-503

ACTIVITY SHEET
KEY

INTERACTION ITEMS

1. The pharynx is often considered a part of what other body system?

   Respiratory system

2. What are the three parts of the pharynx and what is their location?
   a. Nasopharynx - located behind the nose

   b. Orapharynx - located in the area behind the mouth

   c. Laryngopharynx - located behind the larynx

3. There are three stages of swallowing. What are they called and describe each.
   a. Voluntary stage - initiates the process and occurs when the tongue forces food into the pharynx

   b. Pharyngeal stage - from here on the swallowing process is almost automatic. The trachea closes and the esophagus opens due to the action of the epiglottis and-- over--

   c. Esophageal stage - food is transported through the esophagus from the pharynx to the stomach by perstaltic waves.

4. Where would you expect the body of the stomach to be?

   The middle portion

5. Where is the lesser curvature of the stomach?

   It's the smaller curve on the upper right side of the stomach

6. Where is the greater curvature of the stomach?

   It's the larger curve on the lower left side of the stomach

7. Why do you suppose the cardiac sphincter was named so?

   Because it is close to the heart

8. Why do you think the pyloric sphincter was named so?

   Because it is near the pyloric portion of the stomach

9. Why does the stomach need to be so muscular?

   So it can contract and mix food

vocal cords. Peristaltic waves then begin in the pharynx and force food into the esophagus.

10. What do parietal cells secrete?

Hydrochloric acid

11. What do chief cells secrete?

Gastric juice enzymes

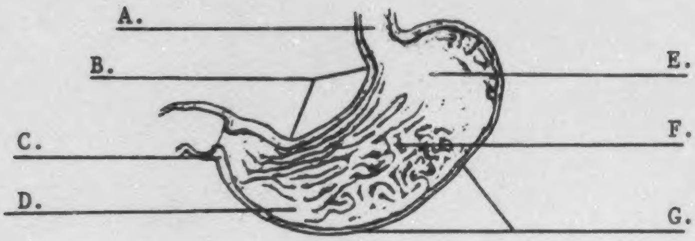
12. What are the major functions of the stomach?
   a. It serves as a reservoir to store food until it can be--over--
   b. Secretes mucus, hydrochloric acid, enzymes, and intrinsic factor
   c. Partially digests food before moving it onward
   d. Carries on a limited absorption

ACTIVITIES

1. Locate the pharynx, epiglottis, esophagus, trachea and component parts of the stomach on available charts and/or models.
2. Sketch a diagram of the stomach and label all divisions, curves and sphincters.

partially digested and moved on.

ACTIVITY SHEET
KEY



A. Cardiac Sphincter

B. Lesser Curvature

C. Pyloric Sphincter

D. Pylorus

E. Fundus

F. Body

G. Greater Curvature

STUDENT EVALUATION
KEY

___Pre-test

___Post test Name ______________________________

B 1. During the pharyngeal stage of swallowing

1. the epiglottis closes
2. the tongue forces food into the pharynx
3. the esophagus opens
4. peristaltic waves begin in the pharynx and force food into the esophagus

a. 1,2,3
b. 1,3,4
c. 2,3,4
d. 1,2,4

C 2. During the pharyngeal stage of swallowing

1. Food is transported through the esophagus from the pharynx to the stomach.
2. Food is moved by peristaltic waves.
3. It is the first stage of swallowing.
4. The stage lasts four to eight seconds.

a. 1,2,3
b. 1,3,4
c. 1,2,4
d. 1,2,3,4

3. The structure that prevents reflux of food from the stomach into the esophagus is the cardiac sphincter.

4. The structure that holds food in the stomach until it is partially digested is the pyloric sphincter.

5. Match the following gastric cells with their secretions.

B epithelial cells	a. hydrochloric acid
A parietal cells	b. mucous
C chief cells	c. gastric enzymes

C 6. The intrinsic factor allows for

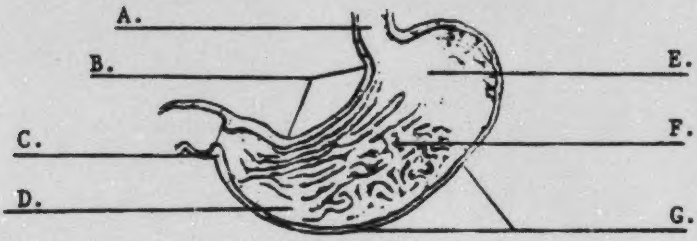
a. storage of food
b. contractions of the stomach
c. absorption of vitamin B_{12}
d. absorption of water, alcohol and drugs

E 7. The stomach

a. secretes substances to help digest food
b. partially digests food
c. acts as a reservoir
d. carries on limited absorption
e. all of the above

8. Label the following diagram of the stomach.

STUDENT EVALUATION KEY



A. Cardiac Sphincter

B. Lesser Curvature

C. Pyloric Sphincter

D. Pylorus

E. Fundus

F. Body

G. Greater Curvature

HO-R83-503 THE PHARYNX, ESOPHAGUS, AND STOMACH - SCRIPT

1. A presentation of The Media Center, State Fair Community College, Sedalia, Missouri.

2. HO-R83-503 THE PHARYNX, ESOPHAGUS, AND STOMACH is the third module in the Gastrointestinal Unit for the course, Body Structure and Function.

3. In this module you will learn about the mechanics of swallowing and progress further along the digestive system to the pharynx, esophagus, and stomach.

4. After completing this module, you should be able to: (1) Recognize the role of the pharynx and esophagus in relation to swallowing.

5. (2) Identify the component parts of the stomach.

6. (3) Differentiate the roles of the cardiac and pyloric sphincters.

7. (4) Distinguish the secreting cells of the stomach by identifying their secretion.

8. (5) Recall the functions carried out by the stomach.

9. The pharynx is the part of the digestive system more commonly referred to as the throat. It is a tubelike structure about five inches long that extends from the base of the skull to the esophagus. It is made of muscle, lined with mucous membrane, and has three parts.

10. The nasopharynx is that part located behind the nose,

11. the orapharynx is in the area behind the mouth,

12. and the laryngopharynx is that part located behind the larynx.

13. The pharynx serves a dual purpose--it serves as a passageway for food as well as for an airway.

14. The pharynx usually functions as part of the respiratory system;

15. However, it is converted for a few seconds during swallowing or deglutition into a tract for the propulsion of food. It also assists other structures in phonation or speech.

16. Food passes from the mouth into the pharynx. Movement of food becomes involuntary after it is swallowed. Alternate contraction and relaxation of the smooth or involuntary muscles, called peristalsis, pushes the food onward in the digestive tract.

17. From the pharynx, food passes to the esophagus. The esophagus is a muscular, collapsible tube about ten inches long that serves as a passageway from the pharynx to the stomach.

18. The esophagus lies immediately behind the trachea and also goes behind the heart as it descends into the thoracic cavity.

19. The esophagus pierces, or goes through, the diaphragm just before it joins the stomach.

20. There are three stages of swallowing. The first stage is the voluntary stage. This stage initiates the process and occurs when the tongue forces food into the pharynx.

21. The second stage of swallowing is the pharyngeal stage. From this point on, the process of swallowing is almost entirely automatic. During this stage, the trachea closes and the esophagus opens due to the action of the epiglottis and vocal cords.

22. Peristaltic waves then begin in the pharynx and force food into the esophagus, completing this phase of swallowing in one to two seconds.

23. The last stage of swallowing is the esophageal stage. During this stage, food is transported through the esophagus from the pharynx to the stomach by peristaltic waves. This stage is completed in four to eight seconds.

24. As the esophagus goes through the diaphragm, it expands into another of the digestive organs, the stomach.

25. The stomach has three divisions. The upper part is called the fundus, the middle part the body, and the lower part the pylorus.

26. The stomach has two curves. The lesser curve is on the upper right side of the stomach and is the smaller of the two curves. The greater curve is on the lower left side and is the larger of the two curves.

27. Circular muscles called sphincters guard both openings of the stomach. The cardiac sphincter is at the top of the stomach. It is named cardiac since it is close to the heart.

28. This sphincter prevents reflex into the esophagus. If gastric acid should get into the esophagus, it causes heartburn.

29. The pyloric sphincter is at the bottom of the pyloric part of the stomach. This sphincter holds food in the stomach so it can be partially digested.

30. Peristaltic waves of the stomach gradually force small amounts of food into the intestine at intervals.

31. The smooth muscle layer of the stomach wall varies from the muscular layer of the rest of the digestive system. It is composed of three muscle layers instead of the usual two, making it one of the strongest internal organs.

32. The mucous lining of the stomach falls in folds called rugae when the stomach is empty.

33. There are many modifications in the mucosa of the stomach which aid in digestion.

34. Epithelial cells secrete mucus that contains an intrinsic factor which causes the absorption of Vitamin B_{12}.

35. Parietal cells secrete hydrochloric acid.

36. Chief cells secrete gastric juice enzymes.

37. The stomach has four main functions which are explained in the next four slides.

38. It serves as a reservoir to store food until it can be partially digested and moved on.

39. The stomach secretes mucus, hydrochloric acid, and enzymes to help digest food. It also secretes an intrinsic factor.

40. Through contraction, the stomach partially digests food by breaking it into smaller pieces and mixing food with gastric secretions before moving it onward.

41. The stomach carries on a limited absorption of water, alcohol, and some drugs.

42. In the final section of this module, the major points presented will be summarized.

43. The pharynx and esophagus are key structures in deglutition or swallowing.

44. The stomach has three divisions, the fundus, body, and the pylorus.

45. The cardiac and pyloric sphincters guard both openings of the stomach.

46. Three sets of secretory cells--epithelial, parietal, and chief--have been identified in this module.

47. The functions of the stomach are: (1) Serves as a reservoir for food (2) Secretes mucus, hydrochloric acid, enzymes, and intrinsic factor (3) Digests foods partially (4) Carries on limited absorption.

48. In the next module of this series, you will learn more about the digestive tract and explore the structure and function of the intestines.

49. (CREDITS)

50. (DISCLAIMER)

51. This is the end of this presentation. Please rewind the tape and return this module to the proper storage area.

HO-R83-504
Student Learning Packet

MEDIA CENTER

STATE FAIR COMMUNITY COLLEGE

1900 CLARENDON ROAD

SEDALIA, MO 65301

Health Occupations

500 Body Structure and Function

04 The Intestines

Date Started __________

Student ______________________ Date Completed __________

Approved __________

Funded by

Missouri Department of Elementary

and Secondary Education

INTRODUCTION

In our study of the gastrointestinal system we began with the mouth and have followed the system down through the pharynx, esophagus and into the stomach. Today we will complete our look at the organs of the digestive system as we study the intestines. The intestines are an extremely important part of the digestive system. This becomes quite evident as you care for patients with alterations in their intestinal function, for in the intestines the majority of our digestion occurs, nutrients are taken into body tissues for utilization, and waste products are eliminated.

OBJECTIVES

Following completion of this module the student should be able to:

1. Locate the small intestine and its divisions on a diagram.
2. Identify the functions of the small intestine.
3. Locate the large intestine and its divisions on a diagram.
4. Identify the functions of the large intestine.

INFORMATIONAL ASSIGNMENT

Read one of the following:

Anthony, Catherine and Alyn, Irene, Structure and Functions of the Body, pp. 99-102, C. B. Mosby Co. 1976.

Memmler, Ruth and Rada, Ruth, Structure and Function of the Human Body, pp. 146-147-152-153-156, J. B. Lippincott Co. 1977.

or the section in your text pertaining to the intestines.

PROCEDURE

1. Review the objectives for this module.
2. Read the information assignment.
3. Obtain the slide/tape presentation.
4. Turn to page 3, the information sheet, and proceed through the slide/tape presentation, jotting down notes as necessary.
5. Complete the activity assignment.
6. Refer back to the objectives to be sure they have been met.
7. Check with your instructor prior to completing the post-test and proceeding to the next module.

INFORMATION SHEET

The small intestine begins at the stomach. It is about one inch in diameter and about 20 feet long! This small bowel has several divisions.

The duodenum is the uppermost 10 to 12 inches. It curves like a letter "C" around the pancreas.

The jejunum is the next segment and is about eight feet in length. It turns forward and then goes downward.

The last segment of the small intestine is the ileum. It is about 11 to12 feet long and joins the large intestine at the ileocecal valve. The ileocecal valve is a sphincter located where the small and large intestine meet. This valve prevents the backflow of material into the small intestine.

The small intestine has three major functions.

Microscopic glands in the small intestine help complete the digestion of food. These include mucous glands that secrete mucous and glands that secrete digestive juices and enzymes.

Absorption of end products occur in the intestinal villi. Villi are finger-like projections that increase the surface area of the intestine, thereby increasing absorption.

The villi contain capillaries to allow absorption into the blood and lacteals, which allow absorption into the lymphatics.

And, the small intestine functions in a rather elaborate system to actually help control other gastrointestinal secretions. These include the pancreatic secretions, bile secretions, the intestinal secretions, and gastric secretions.

The large intestine begins at the junction of the ileum or ileocecal valve. It is about five feet in length, 2½ inches in diameter. The diameter decreases toward the end of the tube.

The sack-like bulges in the large intestine are called haustra.

The large intestine has several divisions. The cecum is the first two to three inches of the large intestine. It is an enlarged area where the ileum attaches. The vermiform appendix protrudes from the end of the cecum.

The next segment of the large intestine is the colon, which has several subdivisions.

The ascending colon carries intestinal contents up the right side of the body.

The transverse colon carries the contents across the top of the abdomen.

The descending colon carries intestinal contents down the left side of the body.

And the sigmoid colon curves downward and joins the rectum.

The rectum is the last 7 to 8 inches of the large intestine and ends at the anus.

The anus is the end of the digestive system. It is the external opening of the system. Two muscular rings called sphincters guard the opening of the anus.

The bends in the large intestine are called flexures.

The hepatic flexure is on the right side of the body near the liver.

The splenic flexure is on the left side of the body near the spleen.

And the sigmoid flexure is in the area of the sigmoid colon.

The large intestine has two major functions: the absorption of water, and the elimination of wastes.

In the final section of this module, the major points presented will be summarized.

The small intestine begins at the stomach and has three divisions. The three major functions are digestion of food, absorption, and control of other gastrointestinal secretions.

The large intestine begins at the junction of the ileum or ileocecal valve and ends at the anus. Its two major functions are absorption of water and elimination of waste.

HO-R83-504

ACTIVITY SHEET

Discussion Items:

1. Where does the small intestine begin? ______________________________

   ____

2. What organ does the duodenum curve around? __________________________

   ____

3. Where else (other than the small intestine) does digestion of food occur?

   ____

4. The lymph system begins as blind pouches in tissues; what are these blind pouches called? ____

5. Where does the large intestine begin? ______________________________

   ____

6. What are the three main functions of the small intestine? ____________

   ____

7. Explain why the divisions of the intestine are called ascending, transverse, and descending. ____

   ____

   ____

8. Are the anal sphincters voluntary or involuntary? Always? ____________

   ____

9. Why are the colon flexures named hepatic, splenic, and sigmoidal? ______

   ____

   ____

10. What are the two major functions of the large intestine? ____________

    ____

    ____

Activity Assignment

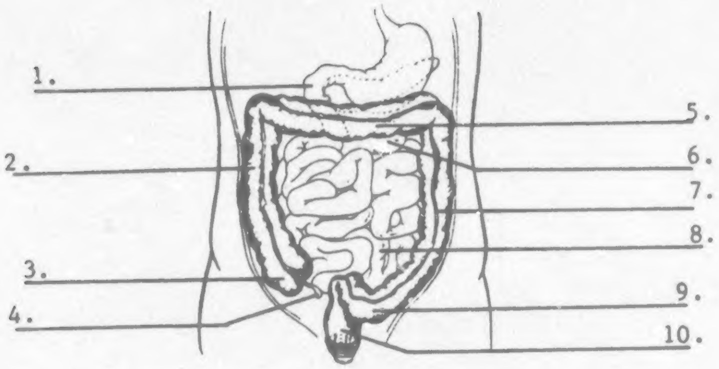
1. Locate the divisions of the intestine and intestinal landmarks on available charts and/or models.

2. Label the diagram of the intestines that is provided.

3. Trace an undigestable object's path through the digestive system from the mouth to the anus, naming all the structures it comes in contact with.

HO-R83-504

ACTIVITY SHEET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1. ____

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6. ____

7. ____

8. ____

9. ____

10. ____

___Pre-test

___Post test Student________________________________

STUDENT EVALUATION

___ 1. Functions of the small intestine are:

1. digestion of food
2. secrete only digestive enzymes
3. absorption
4. help control other gastrointestinal secretions

a. 1,2
b. 3,4
c. 1,3,4
d. 1,3
e. all of the above

___ 2. Functions of the large intestine are:

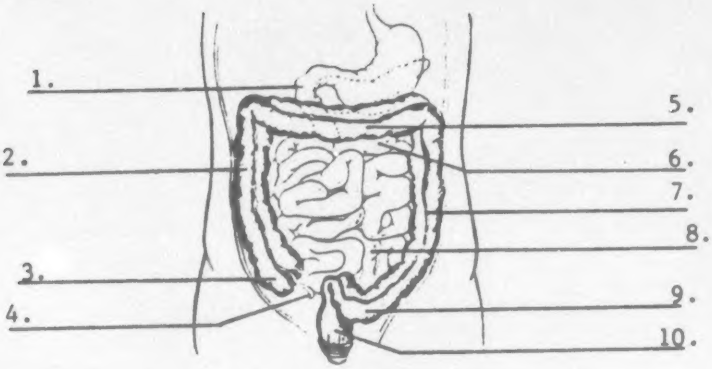
1. secrete digestive enzymes
2. absorb water
3. eliminate wastes
4. produce vitamins K, B_{12}, thiamin, and riboflavin

a. 1,2
b. 2,3,4
c. 2,3
d. 3,4
e. all of the above

3. Label the following diagram of the intestines.

HO-R83-504

STUDENT EVALUATION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1. ____________________

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7. ____________________

8. ____________________

9. ____________________

10. ____________________

LESSON PLAN # HO-R83-504

LESSON PLAN FORMAT

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 504-The Gastrointestinal System
(UNIT TITLE)

SCOPE OF UNIT: Identify the component parts of the gastrointestinal system and explain how they fit together and function to choose nutrients essential for the performance of body processes.

INFORMATION TOPIC # 504 OR DEMONSTRATION # ____

The Intestines
LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

1. Locate the small intestine and its divisions on a diagram.
2. Identify the functions of the small intestine.
3. Locate the large intestine and its divisions on a diagram.
4. Identify the functions of the large intestine.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Slide/tape series "The Intestines"
2. Slide projector
3. Screen
4. Tape player
5. Individualized instruction module
6. Anatomical models and/or charts of the intestine as available

	(Name)	(Date)	Special Learning Features For:
Written By:	D. Hathaway	3-78	
Revised		-83	
Instructional Delivery System By:	97		

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INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

1. Slide/tape series "The Intestines"
2. Student information packet "The Intestines"
3. One of the following or similar information in the student's text:
    a. Anthony, Catherine and Alyn, Irene, Structure and Functions of the Body, pp. 99-102, C. B. Mosby Co. 1976.
    b. Memmler, Ruth and Rada, Ruth, Structure and Function of the Human Body, pp. 146-147-152-153-156, J. B. Lippincott Co. 1977.

REFERENCES: (BIBLIOGRAPHY DATA)

In addition to the above:

1. Anthony, Catherine and Kolthoff, Norma, Textbook of Anatomy and Physiology, C. B. Mosby Co. 1975.
2. Gray, Henry; Goss, Charles (Ed) Anatomy of the Human Body, Lea and Febiger, 1974.
3. Guyton, Arthur, Textbook of Medical Physiology, W. B. Saunder Co. 1976.
4. Tortora, Gerard; Anagnostakos, Nicholas, Principles of Anatomy and Physiology, Harper and Row, 1981.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In our study of the gastrointestinal system we began in the mouth and have followed the system down through the pharynx, esophagus and into the stomach. Today we will complete our look at the organs of the digestive system as we study the intestines. The intestines are an extremely important part of the digestive system. This becomes quite evident as you care for patients with alterations in their intestinal functions, for in the intestines the majority of our digestion occurs, nutrients are taken into body tissues for utilization, and waste products are eliminated.

LESSON PLAN # 504

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 504 — Gastrointestinal System
(Unit or Block Title)

INFORMATION TOPIC # 504 (Technical - General - Guidance)

TITLE: The Intestines

OUTLINE:

- I. Small intestine
  - A. Begins at the stomach II #1
  - B. 1 inch in diameter
  - C. 20 feet in length
  - D. Divisions of the small bowel (no clear demarcations)
    - 1. Duodenum
      - a. Uppermost 10-12 inches
      - b. Curved like the letter C II #2
    - 2. Jejunum
      - a. About 8 feet in length
      - b. It turns forward and downward
    - 3. Ileum
      - a. Last 11-12 feet
      - b. Joins large intestine at ileocecal valve
  - E. Functions of the small intestine
    - 1. Microscopic glands help complete digestion of food II #3
      - a. Mucous glands secrete mucus
      - b. Glands that secrete digestive juices and enzymes
    - 2. Absorption of end products of digestion into villi
      - a. Finger-like projections that increase surface area
      - b. Nutrients and bile salts are absorbed into blood and lymph II #4
        - (1) Capillaries in villi
        - (2) Lacteals in villi
    - 3. Through an elaborate system the small intestine actually helps control other gastrointestinal sections including:
      - a. Pancreatic secretions
      - b. Bile secretions
      - c. Intestinal secretions
      - d. Stomach secretions
- II. Large intestine (colon)
  - A. Begins at the junction of the ileum and ileocecal valve II #5
  - B. About 2½ inches in diameter
  - C. Approximately 5 feet long
  - D. Sac-like bulges are haustrae
  - D. Divisions of the large intestine

        1. Cecum
            a. First 2-3 inches
            b. Enlarged area where ileum attaches
            c. Vermiform appendix protrudes from end
        2. Colon
            a. Ascending-on right
            b. Transverse-across top
            c. Descending-on left II #6
            d. Sigmoid-lower part joining rectum
        3. Rectum
            a. Last 7-8 inches
            b. Ends at anus
        4. Anus
            a. External opening
            b. Guarded by 2 sphincters II #7
    E. Bends in the large intestine are called flexures
        1. Hepatic-on right
        2. Splenic-on left
        3. Sigmoidal-near sigmoid II #8
    F. Functions of the large bowel
        1. Absorbs water
        2. Eliminates waste

III. Summary and conclusion
    A. Small intestine begins at the stomach
        1. Has three divisions
        2. Has three functions
    B. Large intestine begins at the junction of the ileum and ends at the anus. Two functions are
        1. Absorption of water
        2. Elimination of waste
    C. In the next module accessory organs of digestion will be presented

LESSON PLAN # 504

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 504 — Gastrointestinal System
(Unit Title)

INFORMATION TOPIC # 504 or DEMONSTRATION # __________

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Where does the small intestine begin?
2. What organ does the duodenum curve around?
3. Where else has digestion of food occurred?
4. The lymph system begins as blind pouches in tissues. What are these blind pouches called?
5. Where does the large intestine begin?
6. Explain why the divisions of the colon are called ascending, transverse, and descending.
7. Are the anal sphincters voluntary or involuntary? Always?
8. Why are the colon flexures named hepatic, splenic, and sigmoidal?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Locate the divisions of the intestines and intestinal landmarks on available charts and/or models.
2. Label the diagram of the intestines that is provided.
3. Trace an undigestable object's path through the digestive system from the mouth to the anus, naming all the structures it comes in contact with.

LESSON PLAN # 504

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 504 — Gastrointestinal System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

(See Student Evaluation)

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ACTIVITY SHEET
KEY

Discussion Items:

1. Where does the small intestine begin?

   At the pyloric sphincter of the stomach

2. What organ does the duodenum curve around?

   the pancreas

3. Where else (other than the small intestine) does digestion of food occur?

   in the mouth and stomach

4. The lymph system begins as blind pouches in tissues; what are these blind pouches called? lacteals

5. Where does the large intestine begin?

   at the ileocecal valve

6. What are the three main functions of the small intestine? digestion of food, absorption, and control other gastrointestinal secretions

7. Explain why the divisions of the intestine are called ascending, transverse, and descending. These terms describe the direction of each segment in relation to the body. Ascending goes up the right side, transverse across, and descending down the left side.

8. Are the anal sphincters voluntary or involuntary? Always?

   Voluntary, except during early childhood prior to toilet training.

9. Why are the colon flexures named hepatic, splenic, and sigmoidal? These terms describe the location of each flexure, hepatic is near the liver, splenic near the spleen, and sigmoidal involves the sigmoid portion of the colon.

10. What are the two major functions of the large intestine?

    absorption of water and elimination of waste

Activity Assignment

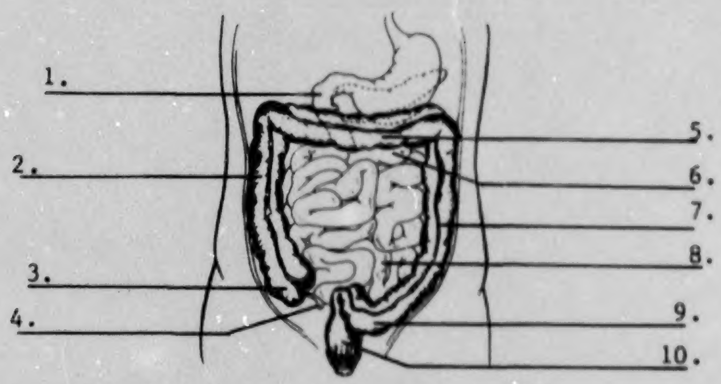
1. Locate the divisions of the intestine and intestinal landmarks on available charts and/or models.

2. Label the diagram of the intestines that is provided.

3. Trace an undigestable object's path through the digestive system from the mouth to the anus, naming all the structures it comes in contact with.

HO-R83-504

ACTIVITY SHEET
KEY



1. Duodenum
2. Ascending colon
3. Cecum
4. Appendix
5. Transverse colon
6. Jejunum
7. Descending colon
8. Ileum
9. Sigmoid colon
10. Rectum

___Pre-test

___Post test

Student ______________________

STUDENT EVALUATION
KEY

C 1. Functions of the small intestine are:

1. digestion of food
2. secrete only digestive enzymes
3. absorption
4. help control other gastrointestinal secretions

a. 1,2
b. 3,4
c. 1,3,4
d. 1,3
e. all of the above

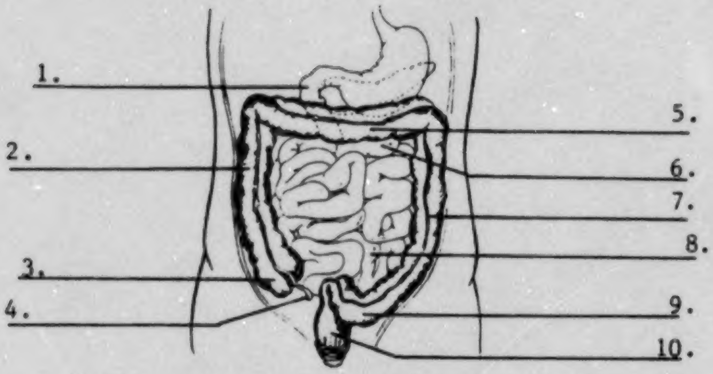
A 2. Functions of the large intestine are:

1. secrete digestive enzymes
2. absorb water
3. eliminate wastes
4. produce vitamins K, B_{12}, thiamin, and riboflavin

a. 1,2
b. 2,3,4
c. 2,3
d. 3,4
e. all of the above

3. Label the following diagram of the intestines.

STUDENT EVALUATION
KEY



1. Duodenum
2. Ascending colon
3. Cecum
4. Appendix
5. Transverse colon
6. Jejunum
7. Descending colon
8. Ileum
9. Sigmoid colon
10. Rectum

HO-R83-504 THE INTESTINES - SCRIPT

1. This is a presentation of The Media Center, State Fair Community College, Sedalia, Missouri.

2. HO-R83-504 THE INTESTINES is the fourth module of the Gastrointestinal Unit for the course, Body Structure and Function.

3. In the study of the Gastrointestinal System, you began with the mouth and have followed the system down through the pharynx, esophagus, and into the stomach.

4. In this module you will learn about the remaining organs of the digestive tract, the intestines.

5. Following completion of this module, you should be able to: (1) Locate the small intestine and its divisions on a diagram.

6. (2) Identify the functions of the small intestine.

7. (3) Locate the large intestine and its divisions on a diagram.

8. (4) Identify the functions of the large intestine.

9. The small intestine begins at the stomach. It is about one inch in diameter and about 20 feet long! This small bowel has several divisions.

10. The duodenum is the uppermost 10 to 12 inches. It curves like a letter "C" around the pancreas.

11. The jejunum is the next segment and is about eight feet in length. It turns forward and then goes downward.

12. The last segment of the small intestine is the ileum. It is about 11 to 12 feet long and joins the large intestine at the ileocecal valve. The ileocecal valve is a sphincter located where the small and large intestine meet. This valve prevents the backflow of material into the small intestine.

13. The small intestine has three major functions.

14. Microscopic glands in the small intestine help complete the digestion of food. These include mucous glands that secrete mucus and glands that secrete digestive juices and enzymes.

15. Absorption of end products occur in the intestinal villi. Villi are finger-like projections that increase the surface area of the intestine, thereby increasing absorption.

16. The villi contain capillaries to allow absorption into the blood and lacteals, which allow aboarption into the lymphatics.

17. And, the small intestine functions in a rather elaborate system to actually help control other gastrointestinal secretions. These include the pancreatic secretions, bile secretions, the intestinal secretions, and gastric secretions.

18. The large intestine begins at the junction of the ileum or ileocecal valve. It is about five feet in length, 2½ inches in diameter. The diameter decreases toward the end of the tube.

19. The sac-like bulges in the large intestine are called haustra.

20. The large intestine has several divisions. The cecum is the first two to three inches of the large intestine. It is an enlarged area where the ileum attaches. The vermiform appendix protrudes from the end of the cecum.

21. The next segment of the large intestine is the colon, which has several subdivisions.

22. The ascending colon carries intestinal contents up the right side of the body.

23. The transverse colon carries the contents across the top of the abdomen.

24. The descending colon carries intestinal contents down the left side of the body.

25. And the sigmoid colon curves downward and joins the rectum.

26. The rectum is the last 7 to 8 inches of the large intestine and ends at the anus.

27. The anus is the end of the digestive system. It is the external opening of the system. Two muscular rings called sphincters guard the opening of the anus.

28. The bends in the large intestine are called flexures.

29. The hepatic flexure is on the right side of the body near the liver.

30. The splenic flexure is on the left side of the body near the spleen.

31. And the sigmoid flexure is in the area of the sigmoid colon.

32. The large intestine has two major functions: the absorption of water, and the elimination of wastes.

33. In the final section of this module, the major points presented will be summarized.

34. The small intestine begins at the stomach and has three divisions. The three major functions are digestion of food, absorption, and control of other gastrointestinal secretions.

35. The large intestine begins at the junction of the ileum or ileocecal valve and ends at the anus. Its two major functions are absorption of water and elimination of waste.

36. In the next module accessory organs of digestion will be presented.

37. (CREDITS)

38. (DISCLAIMER)

39. (REWIND)

HO-R83-505

MEDIA CENTER
STATE FAIR COMMUNITY COLLEGE
1900 CLARENDON ROAD
SEDALIA, MO 65301

Health Occupations
500 Body Structure and Function
505 The Liver, Gallbladder, and Pancreas

Date Started ____________

Student ______________________________

Date Completed ____________

Approved ____________

Funded by
Missouri Department of Elementary
and Secondary Education

INTRODUCTION

The previous lesson completed our look at the structures that comprise the digestive system and those accessory organs closely associated with each. In this lesson we'll examine the three remaining accessory organs--the liver, gallbladder, and pancreas. These structures contribute a great deal to the function of the digestive system, and if they are impaired, the entire digestive process is upset. Once again, the significance of these organs for normal function becomes even more evident as you care for individuals whose function is less than adequate.

OBJECTIVES

Upon completion of this lesson, you should be able to:

1. Locate the liver, gallbladder, and pancreas on a diagram.
2. List the functions which are performed by these accessory organs and their products.
3. Identify the ducts of the biliary tract.

PROCEDURES

1. Review the objectives for this module.
2. Obtain the slide/tape presentation.
3. Turn to page 3, the information sheet, and proceed through the slide/tape presentation, jotting down notes as necessary.
4. Complete the activity sheet.
5. Refer back to the objectives to be sure they have been met.
6. Check with your instructor prior to completing the post-test and proceeding to the next module.

INFORMATION SHEET

The liver is the largest gland in the body, weighing between three and four pounds. It is located in the upper right quadrant of the abdominal cavity, lying immediately below the diaphragm.

The liver is crucial to life itself because it performs many vital functions. Of these, eight major functions will be discussed in this module. The liver manufactures plasma proteins, such as prothrombin and fibrinogen, which play essential parts in blood clotting; and albumin, which helps maintain normal blood volume.

The liver eliminates worn out red blood cells and some bacteria by the process of phagocytosis. In this process, substances are engulfed and destroyed.

Poisons are broken down or transformed into less harmful compounds by the liver. This protective function causes detoxification of certain drugs and of harmful waste formed by bacteria.

Nutrients are stored in the liver where excess monosaccharides are changed into glycogen or fat, which can be stored in the liver. The liver can also transform glycogen, fat, and protein into glucose, depending on the needs of the body.

The liver serves as a storage area for copper, iron, and vitamins A, B_{12}, D, E, and K.

Bile is manufactured by the liver and the small intestine for the emulsification and absorption of fats.

The liver functions in the formation of antibodies, which act against disease organisms.

The liver is the largest reservoir of blood storing 200 to 400 milliliters.

Another accessory organ is the gallbladder which is a pear-shaped, sack-like structure about three to four inches long and one to one and one-half inches wide.

It is attached to the undersurface of the liver and holds 40 to 70 milliliters of bile produced by the liver. The gallbladder has two functions. One is the storage and concentration of bile and the other is the ejection of bile into the duodenum as the gallbladder contracts.

The structure of the biliary tract is as follows: the left and right hepatic ducts emerge and carry bile from their respective lobes of the liver.

These two hepatic ducts then join, forming the common hepatic duct.

The cystic duct then carries the bile to and from the gallbladder.

The common bile duct is that portion of the duct system just below the junction of the cystic and hepatic ducts.

The pancreatic duct joins the bile duct and empties pancreatic secretions into the common bile duct.

The contents of the common bile duct finally enter the duodenum through the hepatopancreatic papilla.

Once in the duodenum, bile is necessary for the emulsification and absorption of fats.

The third major accessory organ is the pancreas, which is a fish-shaped structure weighing approximately three ounces. It lies in the curve of the duodenum just below the stomach.

The pancreas is often divided into three major parts. The head is the portion nearest the duodenum, the body is the middle portion, and the tail is the end section which extends to the spleen.

The pancreas actually functions as two separate glands. As a member of the Endocrine System, it secretes hormones directly into the bloodstream without the help of ducts.

But the pancreas is also an Exocrine Gland which excretes substances through ducts. It is the Exocrine portion of the pancreas that is involved with the Digestive System.

The three digestive enzymes excreted from the pancreas into the duodenum are trypsin, amylase, and lipase. Trypsin digests proteins, amylase helps digest carbohydrates, and lipase helps digest fats.

In this module, the following major topics were presented. The liver is located in the upper right quadrant of the abdomen. It has numerous functions which are vital to life, eight of which were discussed.

The gallbladder is located just under the liver and stores, concentrates, and ejects bile.

The pancreas is located in the curve of the duodenum and serves as an endocrine and exocrine gland. The key ducts of the biliary tract were identified.

ACTIVITY SHEET

THE LIVER, GALLBLADDER, AND PANCREAS

1. Where is the upper right quadrant of the abdominal cavity? ____________

____

2. What is the process whereby bacterial debris is removed from tissues?

____

3. The liver is vital to life. It has eight major functions. List them.

   a. ____
   b. ____
   c. ____
   d. ____
   e. ____
   f. ____
   g. ____
   h. ____

4. Describe the structure of the gallbladder. ____________

____

____

5. What are the two major functions of the gallbladder? ____________

____

____

6. Name the ducts of the biliary tract.

   a. ____________________
   b. ____________________
   c. ____________________
   d. ____________________

7. Label the ducts of the biliary tract.

8. Label the organs on the diagram.

9. What are the functions of the pancreas? ______________________________

____

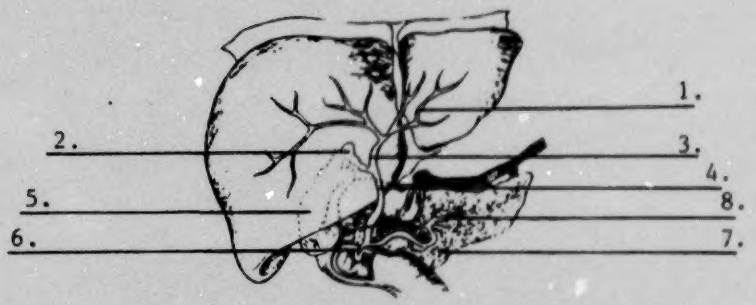
____

____

____

HO-R83-505

ACTIVITY SHEET



1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

5. ______________________________

6. ______________________________

7. ______________________________

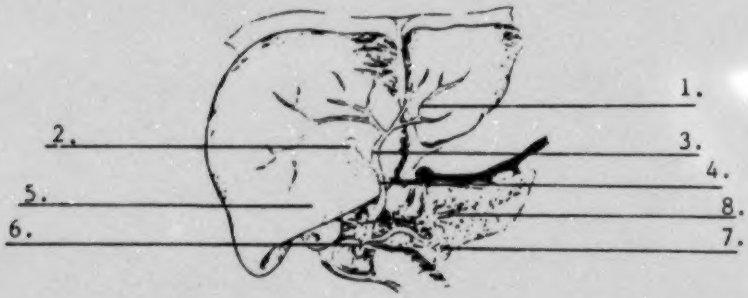
8. ______________________________

___Pre-test

___Post test Student________________________________

STUDENT EVALUATION
KEY
THE LIVER, GALLBLADDER, AND PANCREAS

1. Label the following diagram.



1.________________________________

2.________________________________

3.________________________________

4.________________________________

5.________________________________

6.________________________________

7.________________________________

8.________________________________

2. Bile is manufactured by the ____________________.

   a. Liver
   b. Gallbladder
   c. Pancreas
   d. Spleen

3. Bile digests and helps absorb ____________________.

   a. Protein
   b. Carbohydrates
   c. Vitamins
   d. Fats
   e. Minerals

4. The liver ________________________________.

   a. Is a blood resevoir
   b. Eliminates red blood cells
   c. Stores nutrients
   d. Stores vitamins
   e. Forms clotting substances

   1. 1,3,4,5
   2. 1,3,5
   3. 2,3,4
   4. 1,2,4,5
   5. All of the above

5. The largest gland in the body is the ________________________.

6. The structure that stores and concentrates bile is the ____________.

7. The gland that is both an endocrine and exocrine gland is the ______.

   a. Liver
   b. Gallbladder
   c. Pancreas
   d. Spleen

8. The pancreas secretes ________________________.

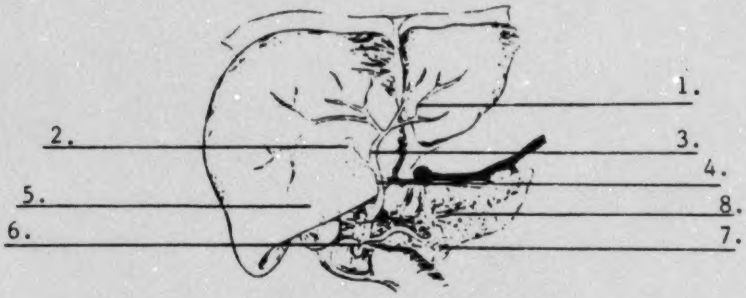
   a. Hormones
   b. Digestive enzymes
   c. Both of the above
   d. Neither of the above

___Pre-test

___Post test Student________________________________

STUDENT EVALUATION
KEY
THE LIVER, GALLBLADDER, AND PANCREAS

1. Label the following diagram.



1.____

2.____

3.____

4.____

5.____

6.____

7.____

8.____

2. Bile is manufactured by the ______________________.

   a. Liver
   b. Gallbladder
   c. Pancreas
   d. Spleen

3. Bile digests and helps absorb ________________________.

   a. Protein
   b. Carbohydrates
   c. Vitamins
   d. Fats
   e. Minerals

4. The liver ____.

   a. Is a blood resevoir
   b. Eliminates red blood cells
   c. Stores nutrients
   d. Stores vitamins
   e. Forms clotting substances

   1. 1,3,4,5
   2. 1,3,5
   3. 2,3,4
   4. 1,2,4,5
   5. All of the above

5. The largest gland in the body is the ___________________________.

6. The structure that stores and concentrates bile is the ____________.

7. The gland that is both an endocrine and exocrine gland is the _______.

   a. Liver
   b. Gallbladder
   c. Pancreas
   d. Spleen

8. The pancreas secretes ______________________________.

   a. Hormones
   b. Digestive enzymes
   c. Both of the above
   d. Neither of the above

LESSON PLAN # HO-R83-505

LESSON PLAN FORMAT

COURSE TITLE/NO. THE BODY STRUCTURE AND FUNCTION

UNIT # 505 Gastrointestinal System

(UNIT TITLE)

SCOPE OF UNIT: Identify the component parts of the gastrointestinal system and explain how they fit together and function to choose nutrients necessary for the performance of body processes.

INFORMATION TOPIC # 505 OR DEMONSTRATION # ______

The Liver, Gallbladder, and Pancreas

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

1. Locate the liver, gallbladder, and pancreas on a diagram.
2. List the functions which are performed by these accessory organs and their products.
3. Identify the ducts of the biliary tract.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Slide/tape presentation "The Liver, Gallbladder, and Pancreas."
2. Slide projector
3. Screen
4. Tape player
5. Individualized instruction module
6. Anatomical models or charts of the liver, gallbladder, and pancreas as available.

	(Name)	(Date)	Special Learning Features For:
Written By:	D. Hathaway	9-78	
Revised	A, Young	83	
Instructional Delivery System By:			

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INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

1. Slide/tape presentation, "The Liver, Gallbladder, and Pancreas."
2. Student information packet, "The Liver, Gallbladder, and Pancreas."
3. One of the following or similar information in the student's text.
   Anthony, Catherine and Kolthoff, Norma, Textbook of Anatomy and Physiology, pp. 399-402,421-422, C. B. Mosby Co., 1975.
   Memmler, Ruth and Wood, Dena, Structure and Function of the Human Body, pp. 147, J. B. Lippincott Co., 1977.

REFERENCES: (BIBLIOGRAPHY DATA)

In addition to the above:

1. Gray, Henry; Goss, Charles (Ed.) Anatomy of the Human Body, Lea and Fibiger, 1974.
2. Guyton, Arthur, Textbook of Medical Physiology, W. B. Saunders Co., 1976.
3. Tortora, Gerard and Anagnostakos, Nicholas, Principles of Anatomy and Physiology-Second Edition, Harper and Row 1981.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

The previous lesson completed our look at the structures that comprise the digestive system and those accessory organs closely associated with each. In this lesson we'll examine the three remaining accessory organs--the liver, gallbladder, and pancreas. These structures contribute a great deal to the function of the digestive system, and if they are impaired, the entire digestive process is upset. Once again, the significance of these organs for normal function becomes evident as you care for individuals whose function is less than adequate.

LESSON PLAN # HO-R83-505

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 505 — Gastrointestinal System
(Unit or Block Title)

INFORMATION TOPIC # 505 **(Technical - General - Guidance)**

TITLE: The Liver, Gallbladder, and Pancreas

OUTLINE:

I. Liver is the largest gland in the body
    A. Weighs 3-4 pounds
    B. Located in upper right quadrant of abdominal cavity II #1
    C. Critical to life due to its functions
        1. Manufactures plasma proteins
            a. prothrombin
            b. fibrinogen - blood clotting
            c. albumin - helps maintain normal blood volume II #2
        2. Eliminates worn out red blood cells (phagocytosis)
        3. Poisons are broken down II #3
        4. Nutrients are stored
        5. Storage area for copper, iron, and Vitamins A, B_{12}, D, E, and K.
        6. Manufactures bile
        7. Functions in the formation of antibodies II #4
        8. Reservoir for blood storage

II. The Gallbladder
    A. Pear-shaped sack
    B. 3-4 inches long and 1-1½ inches wide
    C. Attached to the undersurface of liver
    D. Holds 40-70 milliliters II #5
    E. Functions of the gallbladder
        1. Stores and concentrates bile II #6
        2. Contracts and ejects bile into duodenum
            a. emulsifies fats II #7
            b. helps absorption of fats II #8 II #9
    F. Biliary Tract
        1. Structure
            a. hepatic ducts - right and left emerge
            b. common hepatic duct
            c. cystic duct
            d. common bile duct
            e. pancreatic duct
            f. hepatopancreatic papilla

III. The Pancreas
    A. Fish-shaped structure weighing 3 ounces
    B. 6-9 inches long, 1-1½ inches wide and ½-1 inch thick

- C. Lies in the curve of the duodenum below the stomach
- D. Consists of three parts
  - 1. Head near the duodenum
  - 2. Body
  - 3. Tail extends to the spleen
- E. Functions as two kinds of glands
  - 1. Endocrine gland
    - a. Part of endocrine system
    - b. Ductless--secretes hormones directly into bloodstream
  - 2. Exocrine gland
    - a. Part of digestive system
    - b. Has ducts--excretes digestive enzymes into duodenum II #10
      - (1) Trypsin digests proteins
      - (2) Amylase digests carbohydrates
      - (3) Lipase digests fats

IV. Summary and conclusion

- A. Liver
  - 1. Located in upper right quadrant
  - 2. Has eight major functions
- B. Gallbladder
  - 1. Located under the liver
  - 2. Stores, concentrates and ejects bile
- C. Biliary Tract
- D. Pancreas
  - 1. Located in curve of duodenum
  - 2. As exocrine gland it secretes digestive enzymes
- E. Conclusion: This lesson concludes our look at all the structures of the digestive system, both the digestive organs and the accessory organs. In our next lesson we'll look at some of the specific ways these structures and their products digest the food we consume.

LESSON PLAN # HO-R83-505

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 505 — Gastrointestinal System
(Unit Title)

INFORMATION TOPIC # 505 or DEMONSTRATION # ________

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. Where is the upper right quadrant of the abdominal cavity?
2. What is the process whereby bacterial debris is removed from tissues?
3. Why is this function important?
4. Why does the body need antibodies?
5. Why is it necessary that the gallbladder concentrate bile?
6. What does emulsify mean?
7. Do you think ejection of bile would vary from meal to meal?
8. What would happen to ingested fats if the ejection of bile were blocked?
9. How are endocrine and exocrine different?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Locate the liver, gallbladder, and pancreas on available charts and/or models.
2. Diagram the biliary tract, also indicating the liver, gallbladder, pancreas, and pancreatic duct.

LESSON PLAN # HO-R83-505

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 505 — Gastrointestinal System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

(See Student Evaluation)

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ACTIVITY SHEET
KEY
THE LIVER, GALLBLADDER, AND PANCREAS

1. Where is the upper right quadrant of the abdominal cavity? It's that quarter of the abdomen located on the upper right side.

2. What is the process whereby bacterial debris is removed from tissues? Phagocytosis

3. The liver is vital to life. It has eight major functions. List them.
   a. Manufactures plasma proteins
   b. Eliminates worn out red blood cells
   c. Poisons are broken down
   d. Nutrients are stored
   e. Storage area for copper, iron, and Vitamins A, B_{12}, D, E, K
   f. Manufactures bile
   g. Functions in the formation of antibodies
   h. Reservoir for blood storage

4. Describe the structure of the gallbladder. a pear-shaped sac-like structure about 3-4 inches long and 1 to 1½ inches wide

5. What are the two major functions of the gallbladder? storage and concentration of bile, and ejection of bile into the duodenum

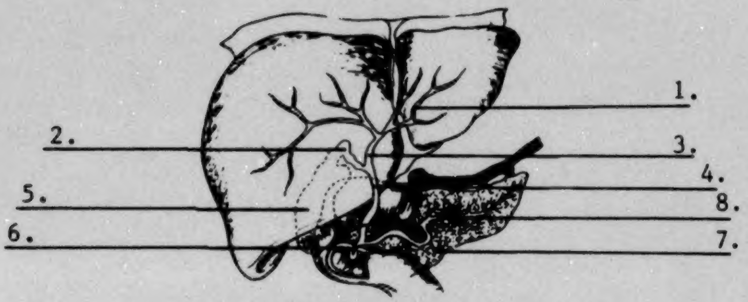
6. Name the ducts of the biliary tract.
   a. Hepatic ducts - right and left
   b. Common bile duct
   c. Cystic duct
   d. Pancreatic duct

7. Label the ducts of the biliary tract.

8. Label the organs on the diagram.

9. What are the functions of the pancreas? as part of the endocrine system, it secretes hormones directly into the blood stream without the help of ducts. As part of the exocrine gland it secretes substances without ducts. The enzymes secreted are trypsin, amylase, and lipase. Trypsin digests proteins, amylase helps digests carbohydrates, and lipase helps digest fats.

ACTIVITY SHEET
KEY



1.Left hepatic duct

2.Cystic duct

3.Common hepatic duct

4.Common bile duct

5.Gallgladder

6.Ampulla of vater

7.Pancreatic duct

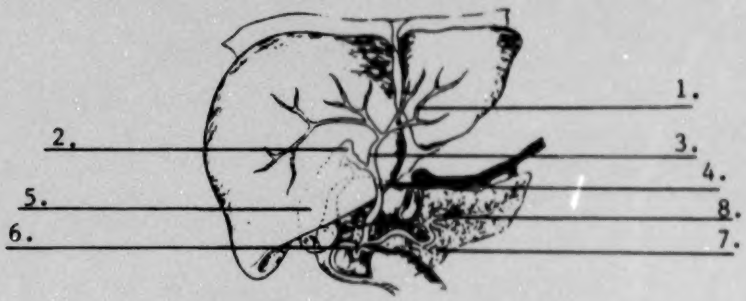
8.Pancreas

___Pre-test

___Post-test Student ______________________________

STUDENT EVALUATION
KEY
THE LIVER, GALLBLADDER, AND PANCREAS

1. Label the following diagram.



1.Left hepatic duct

2.Cystic duct

3.Common hepatic duct

4.Common bile duct

5.Gallgladder

6.Ampulla of vater

7.Pancreatic duct

8.Pancreas

2. Bile is manufactured by the ________A________.

   a. Liver
   b. Gallbladder
   c. Pancreas
   d. Spleen

3. Bile digests and helps absorb ________D________.

   a. Protein
   b. Carbohydrates
   c. Vitamins
   d. Fats
   e. Minerals

4. The liver ________5________.

   a. Is a blood resevoir
   b. Eliminates red blood cells
   c. Stores nutrients
   d. Stores vitamins
   e. Forms clotting substances

   1. 1,3,4,5
   2. 1,3,5
   3. 2,3,4
   4. 1,2,4,5
   5. All of the above

5. The largest gland in the body is the ________liver________.

6. The structure that stores and concentrates bile is the gallbladder.

7. The gland that is both an endocrine and exocrine gland is the ____C____.

   a. Liver
   b. Gallbladder
   c. Pancreas
   d. Spleen

8. The pancreas secretes ________C________.

   a. Hormones
   b. Digestive enzymes
   c. Both of the above
   d. Neither of the above

HO-R83-505 THE LIVER, GALLBLADDER, AND PANCREAS - SCRIPT

1. This is a presentation of The Media Center, State Fair Community College, Sedalia, Missouri.

2. HO-R83-505 THE LIVER, GALLBLADDER, AND PANCREAS is the fifth module of the Gastrointestinal Unit of the course, Body Structure and Function.

3. In this module you will examine the three major accessory organs--the liver, gallbladder, and pancreas which assist in the digestive process.

4. Following completion of this module, you should be able to: (1) Locate the liver, gallbladder, and pancreas on a diagram.

5. (2) List the functions which are performed by these accessory organs and their products.

6. (3) Identify the ducts of the biliary tract.

7. The liver is the largest gland in the body, weighing between three and four pounds. It is located in the upper right quadrant of the abdominal cavity, lying immediately below the diaphragm.

8. The liver is crucial to life itself because it performs many vital functions. Eight of these major functions will be discussed in this module.

9. The liver manufactures plasma proteins, such as; prothrombin and fibrinogen, which play essential parts in blood clotting; and albumin, which helps maintain normal blood volume.

10. The liver eliminates worn out red blood cells and some bacteria by the process of phagocytosis. In this process substances are engulfed and destroyed.

11. Poisons are broken down or transformed into less harmful compounds by the liver. This protective function causes detoxification of harmful waste formed by certain drugs and bacteria.

12. Nutrients are stored in the liver where excess monosaccharides are changed into glycogen or fat, which can be stored in the liver. The liver can also transform glycogen, fat, and protein into glucose, depending on the needs of the body.

13. The liver serves as a storage area for copper, iron, and vitamins A, B_{12}, D, E, and K.

14. Bile is manufactured by the liver and used in the small intestine for the emulsification and absorption of fats.

15. The liver functions in the formation of antibodies, which act against disease organisms.

16. The liver is the largest reservoir of blood, storing 200 to 400 milliliters.

17. Another accessory organ is the gallbladder, which is a pear-shaped, sacklike structure about three to four inches long and one to one and one-half inches wide.

18. It is attached to the undersurface of the liver and holds 40 to 70 milliliters of bile produced by the liver. The gallbladder has two functions, one is the storage and concentration of bile.

19. The other is the ejection of bile into the duodenum as the gallbladder contracts.

20. The structure of the biliary tract is as follows:

21. The left and right hepatic ducts emerge and carry bile from their respective lobes of the liver.

22. These two hepatic ducts then join, forming the common hepatic duct.

23. The cystic duct then carries the bile to and from the gallbladder.

24. The common bile duct is that portion of the duct system just below the junction of the cystic and hepatic ducts.

25. The pancreatic duct joins the bile duct and empties pancreatic secretions into the common bile duct.

26. The contents of the common bile duct finally enter the duodenum through the hepatopancreatic papilla.

27. Once in the duodenum, bile is necessary for the emulsification and absorption of fats.

28. The third major accessory organ is the pancreas, which is a fish-shaped structure weighing approximately three ounces. It lies in the curve of the duodenum just below the stomach.

29. The pancreas is often divided into three major parts. The head is the portion nearest the duodenum, the body is the middle portion, and the tail is the end section which extends to the spleen.

30. The pancreas actually functions as two separate glands. As a member of the Endocrine System, it secretes hormones directly into the bloodstream without the help of ducts.

31. But the pancreas is also an Exocrine Gland which excretes substances through ducts. It is the Exocrine portion of the pancreas that is involved with the Digestive System.

32. Digestive enzymes excreted from the pancreas into the duodenum are trypsin, amylase, and lipase.

33. Trypsin digests proteins. Amylase helps digest carbohydrates. Lipase helps digest fats.

34. In summary,

35. the liver is located in the upper right quadrant of the abdomen. It has numerous functions which are vital to life, eight of which were discussed.

36. The gallbladder is located just under the liver and stores, concentrates, and ejects bile.

37. The pancreas is located in the curve of the duodenum and serves as an endocrine and exocrine gland.

38. The key ducts of the biliary tract were identified.

39. In the next module, the process of digestion will be presented.

40. (CREDITS)

41. (DISCLAIMER)

42. (REWIND)

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1900 CLARENDON ROAD

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Health Occupations

500 Body Structure and Function

06 Digestion of Food

Date Started __________

Student ____________________________ Date Completed __________

Approved __________

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Missouri Department of Elementary

and Secondary Education

INTRODUCTION

Previous lessons in this unit have primarily explored the structure of the digestive system. In this lesson we'll begin a much closer examination of the function of these structures which is digestion of the food we consume. This topic is of importance since unless our food is digested properly, it will be unavailable for use by our bodies. Information presented in this lesson should not only contribute to your understanding of clinical conditions which deviate from the norm, but also to normal occurances that provide nutrients necessary to maintain life.

OBJECTIVES

Following completion of this module the student should be able to:

1. Describe mechanical digestion.
2. Describe chemical digestion.
3. Name the digestive enzymes and identify their source.
4. Identify end products of the digestion of carbohydrate, fat, and protein.

INFORMATIONAL ASSIGNMENT

Read one of the following:

Anthony, Catherine and Alyn, Irene, Structure and Function of the Body, pp. 105-106, C. V. Mosby Co., 1976.

Memmler, Ruth and Wood, Dena, Structure and Function of the Human Body, pp. 143-147, J. B. Lippincott Co., 1977.

The section in your text pertaining to digestion.

PROCEDURES

1. Review the objectives for this module.
2. Read the informational assignment.
3. Obtain the slide/tape presentation.
4. Turn to page 3, the information sheet, and proceed through the slide/tape presentation, jotting down notes as necessary.
5. Complete the activity assignment.
6. Refer back to the objectives to be sure they have been met.
7. Check with your instructor prior to completing the post test and proceeding to the next module.

INFORMATION SHEET

Digestion is the sum of all the changes food undergoes in the alimentary canal. There are two kinds of digestion, mechanical and chemical.

Mechanical digestion is the changing of ingested food from large, solid pieces to absorbable form.

Mechanical digestion starts in the mouth where mastication or chewing movement reduces the size of food and mixes it with saliva. Deglutition or swallowing moves the food from the mouth through the oral pharynx into the esophagus.

Peristalsis, a wave-like movement that squeezes food downward in the tract, is initiated in the esophagus.

Food enters the stomach where churning occurs. Peristalsis continues the movement of food into the duodenum.

Churning and peristalsis continue in the small intestine. Churning assists in mixing food with the digestive juices whereas peristalsis propels food onward along the digestive tract.

Food continues from the small intestine to the large intestine where peristalsis continues. Churning movements occur within the haustral sacs of the large intestine.

Peristaltic movement continues through the descending colon to the rectum where waste products are eliminated through the anus by defecation.

Chemical digestion consists of the changes in chemical composition that food undergoes in its travel through the gastrointestinal tract. Chemical reactions occur by enzymes acting on proteins, carbohydrates, and fat. Enzymes are catalysts which accelerate chemical reations.

Chemical digestion starts in the mouth where the enzyme, ptyalin, mixes with food and initiates the process of digestion by changing some of the starches into sugars.

When the food reaches the stomach, it is acted upon by the gastric juice which contains hydrochloric acid and certain enzymes. The enzymes in the stomach are pepsin, rennin, and lipase. The functions of these enzymes are: pepsin begins the breakdown of protein into simpler forms in preparation for further digestion in the small intestines, rennin converts protein in milk into a more digestable form (rennin is secreted in larger amounts in babies), and lipase acts on fats but is of minor importance in the stomach because the fat particles in the stomach are too large.

The food mixture leaving the stomach entering the small intestine is called chyme. Carbohydrate digestion in the small intestine occurs when enzymes digest the disaccharides (double sugar) into monosaccharides (simple sugar). Maltase, sucrase, and lactase are the enzymes that break down carbohydrates into simple sugars.

Trypsin, the enzyme found in pancreatic juice continues the digestion of protein in the small intestine. Trypsin breaks protein down into amino acids.

Protein digestion is completed by several intestinal enzymes grouped together under the name erepsin, which converts all the remaining compound amino acids into single amino acids.

Almost all fat or lipid digestion occurs in the small intestine. The process begins with emulsification of natural fats by bile.

Pancreatic lipase, an enzyme found in pancreatic juice, hydrolyzes each fat molecule. In essence, the pancreatic lipase breaks each fat molecule into fatty acids and glycerol.

The food mixture passes from the small intestine to the large intestine where no further digestion occurs.

In this module, the following major topics were presented: mechanical digestion in the gastrointestinal tract, chemical digestion, and enzymatic conversion of carbohydrates, proteins, and fats to their simpler respective forms.

HO-R83-506

ACTIVITY SHEET

Digestion of Food

1. Distinguish between mechanical and chemical digestion.________________

____

____

2. Where is the first place mechanical digestion occurs? ________________

____

3. Where is the next place mechanical digestion occurs? ________________

____

4. Describe what is meant by peristaltic waves. ________________________

____

____

5. What is a catalyst? ____

____

6. What is the enzyme found in the mouth that initiates chemical digestion?

____

7. What are the enzymes found in gastric juice and what are their functions?

____

____

____

8. What is the enzyme found in pancreatic juice that continues the digestion of protein in the small intestine?________________________________

9. Where does almost all of the fat or lipid digestion occur? ____________

____

HO-R83-506

___Pre-test

___Post test Student___________________________

STUDENT EVALUATION

Digestion of Food

1. Match the following statements to the appropriate term or terms in the right hand column.

___ Makes the stomach acidic

___ Emulsifies fat

___ Occurs in the stomach

___ Begins in the mouth

___ Converts protein in milk into a more digestable form

___ Begins the breakdown of protein

___ Present in the mouth to begin chemical digestion

___ Hydrolyzes each fat molecule

___ Intestinal enzymes that convert compound amino acids into simple amino acids

___ No digestion occurs

___ A wave-like movement that propels food through the digestive system

___ Changes in chemical composition of food in the GI tract

A. Ptyalin
B. Erepsin
C. Large intestine
D. Hydrochloric acid
E. Mechanical digestion
F. Chemical digestion
G. Peristalsis
H. Pepsin
I. Bile
J. Rennin
K. Churning
L. Chymotrypsin
M. Pancreatic lipase

2. Give an example of mechanical digestion. ___________________________

3. Give an example of chemical digestion (could be any one occuring throughout the GI tract during digestion).

____

____

LESSON PLAN # HO-R83-506

LESSON PLAN FORMAT

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 506-Gastrointestinal System
(UNIT TITLE)

SCOPE OF UNIT: Identify the component parts of the gastrointestinal system and explain how they fit together and function to choose nutrients necessary for the performance of body processes.

INFORMATION TOPIC # 506 OR DEMONSTRATION #

Digestion of Food
LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

1. Describe mechanical digestion.
2. Describe chemical digestion.
3. Name the digestive enzymes and identify their source.
4. Identify end products of the digestion of carbohydrate, fat, and protein.

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Slide/tape presentation "Digestion of Food".
2. Slide projector
3. Screen
4. Tape player
5. Individualized instruction module
6. Anatomical charts and/or models of the digestive system as available.

	(Name)	(Date)	Special Learning Features For:
Written By:	D. Hathaway	9-78	
Instructional Delivery System By:	Columbia Public Schools		

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INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

1. Slide/tape presentation, "Digestion of Food."
2. Student information packet, "Digestion of Food."
3. One of the following or similar information in the student's text.
   Anthony, Catherine and Alyn, Irene, Structure and Function of the Body, pp. 105-106, C. B. Mosby Co. 1976.
   Memmler, Ruth and Wood, Dena, Structure and Function of the Human Body, pp. 143-147, J. B. Lippincott Co. 1977.

REFERENCES: (BIBLIOGRAPHY DATA)

In addition to the above:

1. Anthony, Catherine and Kolthaff, Norma, Textbook of Anatomy and Physiology, C. B. Mosby Co. 1975.
2. Gray, Henry: Goss, Charles (Ed.), Anatomy of the Human Body, Lea and Febiger, 1974.
3. Guyton, Arthur, Textbook of Medical Physiology, W. B. Saunders Co. 1976.
4. Miller, Marjorie, and Leavell, Lutie, Anatomy and Physiology, 16th Edition, Macmillan Publishing Co., Inc. New York 1972.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

Previous lessons in this unit have primarily explored the structure of the digestive system. In this lesson we'll begin a much closer examination of the function of these structures, which is digestion of the food we consume. This topic is of importance since unless our food is digested properly, it will be unavailable for use by our bodies. Information presented in this lesson should not only contribute to your understanding of clinical conditions which deviate from the norm, but also to normal occurrences that provide nutrients necessary to maintain life.

LESSON PLAN # HO-R83-506

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 506 — Gastrointestinal System
(Unit or Block Title)

INFORMATION TOPIC # 506 **(Technical - General - Guidance)**

TITLE: Digestion of Food

OUTLINE:

I. Mechanical digestion - breaking food into smaller parts II #1
  A. Mouth II #2
    1. Chewing movements
    2. Reduces size of food and mixes with saliva
  B. Pharynx to esophagus
    1. Food is moved onward - peristalsis
    2. No digestion
  C. Stomach
    1. Churning
    2. Movement continues - peristalsis II #3
  D. Small intestine
    1. Churning - mixes food with the digestive juices
    2. Peristalsis - moves food onward
  E. Large intestine
    1. Churning - within haustral sacs
    2. Peristalsis continues
  F. Anus - wasts elimination
II. Chemical digestion - changes in chemical composition II #4
  A. Mouth
    1. Enzyme - ptyalin
    2. Starches are changed to sugars
  B. Stomach
    1. Gastric juice - contains hydrochloric acid and certain enzymes
    2. Enzymes and their function
      a. pepsin - begins the breakdown of protein into simpler forms
      b. rennin - converts protein in milk into a more digestable form
      c. lipase - acts on fats II #5
  C. Small intestine - food mixture now called chyme
    1. Carbohydrates - simple sugars broken down by enzymes
      a. maltose
      b. sucrase
      c. lactase II #7
    2. Protein
      a. Trypsin - enzyme
        1. found in pancreatic juice
        2. breaks protein into amino acids II #8

- b. Erepsin
  - 1. several intestinal enzymes grouped under one name

  - 2. converts remaining compounds amino acids into single amino acids
- 3. Fat
  - a. emulsification of natural fats by bile II #9
  - b. pancreatic lipase breaks fat molecule into fatty acids and glycerol
- D. Large intestine - no furhter digestion

III. Summary and conclusion
- A. Mechanical digestion - through the GI tract
- B. Chemical digestion - through the GI tract
- C. This lesson we learned how the food we consume is digested. In our next and final module in this series we will see how the nutrients from this digested food are absorbed for use by our body.

LESSON PLAN # HO-R83-506

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 506 — Digestion of Food
(Unit Title)

INFORMATION TOPIC # 506 or DEMONSTRATION # ______

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is mechanical digestion?
2. Where is the first place mechanical digestion occurs?
3. Describe what is meant by peristaltic waves.
4. How is chemical digestion different than mechanical digestion?
5. What enzymes are contained in gastric juice?
6. What enzymes break down carbohydrates into simple sugars?
7. What enzyme breaks protein into amino acids?
8. How does bile prepare fats for digestion by lipase?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. Follow an undigestable object through the digestive system, noting what secretions occur along the way and what these secretions normally do.

LESSON PLAN # HO-R83-506

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 506 — Gastrointestinal System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

(See Student Evaluation)

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HO-R83-506

ACTIVITY SHEET
KEY
Digestion of Food

1. Distinguish between mechanical and chemical digestion. Mechanical digestion consists of breaking food into smaller particles whereas chemical digestion consists of chemical changes in composition.

2. Where is the first place mechanical digestion occurs?
in the mouth

3. Where is the next place mechanical digestion occurs?
in the stomach

4. Describe what is meant by peristaltic waves. It's a constrictive ring that moves food onward through the digestive tube.

5. What is a catalyst? In digestion, enzymes that accelorate chemical reactions.

6. What is the enzyme found in the mouth that initiates chemical digestion?
pytalin

7. What are the enzymes found in gastric juice and what are their functions?
   a. pepsin - begins breakdown of protein into simple forms
   b. rennin - converts protein in milk into a more digestable form
   c. lipase - acts on fats

8. What is the enzyme found in pancreatic juice that continues the digestion of protein in the small intestine? trypsin

9. Where does almost all of the fat or lipid digestion occur?
small intestine

HO-R83-506

___Pre-test

___Post test Student________________________

STUDENT EVALUATION
KEY
Digestion of Food

1. Match the following statements to the appropriate term or terms in the right hand column.

D Makes the stomach acidic

I Emulsifies fat

K Occurs in the stomach

E Begins in the mouth

J Converts protein in milk into a more digestable form

H Begins the breakdown of protein

A Present in the mouth to begin chemical digestion

M Hydrolyzes each fat molecule

B Intestinal enzymes that convert compound amino acids into simple amino acids

C No digestion occurs

G A wave-like movement that propels food through the digestive system

F Changes in chemical composition of food in the GI tract

A. Ptyalin
B. Erepsin
C. Large intestine
D. Hydrochloric acid
E. Mechanical digestion
F. Chemical digestion
G. Peristalsis
H. Pepsin
I. Bile
J. Rennin
K. Churning
L. Chymotrypsin
M. Pancreatic lipase

2. Give an example of mechanical digestion. Chewing

3. Give an example of chemical digestion (could be any one occuring throughout the GI tract during digestion).

HO-R83-506 DIGESTION OF FOOD - SCRIPT

1. This is a presentation of The Media Center, State Fair Community College, Sedalia, Missouri.

2. HO-R83-506 DIGESTION OF FOOD is the sixth module of the Gastrointestinal Unit for the course, Body Structure and Function.

3. In this module the process of digestion will be presented. With proper digestion, nutrients will be available for use by the body.

4. Following completion of this module, you should be able to: (1) Describe mechanical digestion.

5. (2) Describe chemical digestion.

6. (3) Name the digestive enzymes and identify their source.

7. (4) Identify end products of the digestion of carbohydrate, fat, and protein.

8. Digestion is the sum of all the changes food undergoes in the alimentary canal. There are two kinds of digestion, mechanical and chemical.

9. Mechanical digestion is the changing of ingested food from large, solid pieces to an absorbable form.

10. Mechanical digestion starts in the mouth where mastication or chewing movement reduces the size of food and mixes it with saliva.

11. Deglutition or swallowing moves the food from the mouth through the oropharynx into the esophagus and is completed by the time food reaches the stomach.

12. Peristalsis, a wave-like movement that squeezes food downward in the tract, is initiated in the esophagus.

13. Food enters the stomach where churning occurs and peristalsis continues the movement of food into the duodenum.

14. Churning and peristalsis continue in the small intestine. Churning assists in mixing food with the digestive juices whereas peristalsis propels food onward along the digestive tract.

15. Food continues from the small intestine to the large intestine where peristalsis continues. Churning movements occur within the haustral sacs of the large intestine.

16. Peristalsis movement continues through the descending colon to the rectum where waste products are eliminated through the anus by defecation.

17. Chemical digestion consists of the changes in chemical composition that food undergoes in its travel through the gastrointestinal tract. Chemical reactions occur by enzymes acting on proteins, carbohydrates, and fats. Enzymes are catalysts which accelerate chemical reactions.

18. Chemical digestion starts in the mouth where the enzyme, ptyalin, mixes with food and initiates the process of digestion by changing some of the starches into sugars.

19. When the food reaches the stomach, it is acted upon by the gastric juice which contains hydrochloric acid and certain enzymes. The enzymes in the stomach are pepsin, rennin, and lipase.

20. Pepsin begins the breakdown of protein into simpler forms in preparation for further digestion in the small intestines.

21. Rennin converts protein in milk into a more digestable form. Rennin is secreted in larger amounts in babies.

22. Lipase acts on fats but is of minor importance in the stomach because the fat particles in the stomach are large.

23. The food mixture leaving the stomach and entering the small intestine is called chyme.

24. Carbohydrate digestion in the small intestine occurs when enzymes digest the disaccharides (double sugar) into monosaccharides (simple sugar). Maltase, sucrase, and lactase are the enzymes that break down carbohydrates into simple sugars.

25. Trypsin, the enzyme found in pancreatic juice continues the digestion of protein in the small intestine. Trypsin breaks protein down into amino acids.

26. Protein digestion is completed by several intestinal enzymes grouped together under the name erepsin, which converts all the remaining compound amino acids into single amino acids.

27. Almost all fat or lipid digestion occurs in the small intestine. The process begins with the emulsification of natural fats by bile.

28. Pancreatic lipase, an enzyme found in pancreatic juice, hydrolyzes each fat molecule. In essence, the pancreatic lipase breaks each fat molecule into fatty acids and glycerol.

29. The food mixture passes from the small intestine to the large intestine where no further digestion occurs.

30. In this module, you have learned about the following content related to digestion of food.

31. Mechanical digestion starts in the mouth and is completed by the time food reaches the stomach.

32. Chemical digestion occurs as food moves through the gastrointestinal tract.

33. Enzymes convert carbohydrates to simple sugars, proteins to amino acids, and fats to fatty acids and glycerol during digestion.

34. Three enzymes work in the stomach--pepsin, rennin, and lipase.

35. In the small intestine, maltase, sucrase, and lactase break down carbohydrates, trypsin and erepsin break down protein, and pancreatic lipase hydrolyzes fat.

36. The end products of protein, fat, and carbohydrate digestion are amino acids, fatty acids and glycerol, and simple sugars.

37. In the last module of the series, the absorption of nutrients or the products of digestion will be presented.

38. (CREDITS)

39. (DISCLAIMER)

40. (REWIND)

HO-R83-507

MEDIA CENTER

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Health Occupations

500 Body Structure and Function

07 Absorption of Nutrients

Date Started ______

Student ____________________________ Date Completed _______

Approved _______

Funded by

Missouri Department of Elementary

and Secondary Education

INTRODUCTION

In the last lesson we learned how the food we consume is digested. In this lesson we will look at how this digested food is absorbed and utilized by the body. An understanding of these processes is of importance to you for unless our food is absorbed it cannot be used by the millions of cells composing our body. And if the cells are not utilizing nutrients, body processes cease. Malabsorption and altered utilization of nutrients is seen to some extent in most gastrointestinal disorders whether mild or severe in nature, making these common problems encountered by health care workers.

OBJECTIVES

Following completion of this module the student should be able to:

1. Define absorption
2. Recognize areas where absorption occurs
3. Describe metabolism
4. Differentiate between anabolism and catabolism

PROCEDURES

1. Review the objectives for this module.
2. Read the information assignment.
3. Obtain the slide/tape presentation.
4. Turn to page 3, the information sheet, and proceed through the slide/tape presentation, jotting down notes as necessary.
5. Complete the activity sheet.
6. Refer back to the objectives to be sure they have been met.
7. Check with your instructor prior to completing the post-test and proceeding to the next module.

INFORMATION ASSIGNMENT

Read one of the following:

Anthony, Catherine and Alyn, Irene, Structure and Function of the Body, pp. 106-109, C. V. Mosby Co. 1976.

The section on absorption in your textbook.

INFORMATION SHEET

Absorption is the passage of a substance through a membrane such as skin or mucus, into the blood.

The stomach is the first place where absorption occurs. The process in the stomach is limited to materials already of absorbable size which can pass across cell membranes. Practically speaking, water is the primary material absorbed in the stomach. However, the amount is limited.

The greatest amount of absorption takes place in the small intestine where folds and villi increase the surface area to aid in absorption.

The products of digestion are absorbed into the blood and lymph vessels of the villi.

Products absorbed in the small intestine include water, nutrients, electrolytes, and some mineral salts.

Absorption continues in the large intestines but to a greatly reduced degree with most of the absorption occurring in the proximal portion of the colon. Products absorbed in the large intestine include water, sodium, chloride, and some vitamins.

Products not absorbed in the large intestine form fecal material consisting of water and solids such as mucus, food residue, microorganisms, and sloughed off epithelial cells.

Digestion and absorption are only preliminary steps for metabolism. Metabolism refers to all of the physical and chemical activities whereby nutrients are utilized.

There are two kinds of metabolism. These are anabolism and catabolism.

Anabolism is the production of complex compounds from simplex compounds.

Catabolism is the reverse of anabolism. It is the breaking down of nutrients for use as energy.

Examples of compounds produced by anabolism include hormones, enzymes, and proteins.

In carbohydrate anabolism, the liver converts glucose to glycogen, a process called glycogenesis. Glycogen is stored in the liver for use by the body cells.

In carbohydrate catabolism, the process of glycolysis releases energy in the form of glucose from glycogen stored in the liver.

In fat metabolism, the catabolic process is called ketogenesis while the anabolic process allows fat to be stored in adipose tissue.

Protein metabolism occurs primarily in the liver. Here the catabolic process breaks down protein which is released in the urine as urea. In protein anabolism, protein will be retained, resulting in tissue building.

In this module the following major topics were presented. We have defined absorption, the areas where absorption of nutrients occurs and the structures involved, and the processes of anabolism and catabolism.

ACTIVITY SHEET

12. What happens during the catabolic process involving protein? ________

1. Before food is ready to be absorbed what must have occured? ________

2. What is absorption? ________

3. List the places where absorption occurs. ________

4. Rugae increase the surface area of the stomach, what structures increase the surface area of the small intestine? ________

5. What is the name of the lymph vessel located in the villi? ________

6. What is metabolism? ________

7. Anabolism is the production of complex compounds from simple compounds whereas catabolism is ________

8. List three examples of compounds produced by anabolism.
   a. ________
   b. ________
   c. ________

9. What is glycogenesis? ________

10. What is glycolysis? ________

11. In fat metabolism the catabolic process is called ________.

12. What happens during the catabolic process involving protein?____________

____

____

HO-R83-507

___Pre-test

___Post test　　　　Student________________________________

STUDENT EVALUATION

Absorption of Nutrients

1. Place an A in front of the following parts of the digestive system where absorption occurs:
   ___Mouth
   ___Pharynx
   ___Esophagus
   ___Stomach
   ___Small intestine
   ___Large intestine

2. What structures in the stomach help increase absorption?________________

   ____

3. What structures in the small intestine help increase absorption?________

   ____

4. Match the following statements to the appropriate term or phrase.

___All the physical and chemical activities whereby nutrients are used.
___Production of complex compounds from simple compounds.
___Process whereby the liver converts glucose to glycogen.
___Process whereby energy is released in the form of glucose from glycogen stored in the liver.
___Passage of a substance through a membrane.
___Breaking down nutrients for use as energy.
___The catabolic process associated with fat.
___An example of a product produced by anabolism.
___Process whereby protein is retained for tissue building.

A. Anabolism
B. Catabolism
C. Enzymes
D. Glycogenesis
E. Glycolysis
F. Absorption
G. Utilization
H. Ketogenesis
I. Metabolism
J. Anabolic process of protein metabolism
K. Catabolic process of protein metabolism

LESSON PLAN # HO-R83-507

LESSON PLAN FORMAT

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 507-Gastrointestinal

(UNIT TITLE)

SCOPE OF UNIT: Identify the component parts of the gastrointestinal system and explain how they fit together and function to choose nutrients necessary for the performance of body processes.

INFORMATION TOPIC # 507 OR DEMONSTRATION # ________

Absorption of Nutrients

LESSON TITLE

LESSON OBJECTIVE - THE STUDENT SHOULD BE ABLE TO:

1. Define absorption
2. Recognize areas where absorption occurs
3. Describe metabolism
4. Differentiate between anabolism and catabolism

SUPPLEMENTARY TEACHING/LEARNING ITEMS: (AIDS, TOOLS, MATERIALS, ETC.)

1. Slide/tape presentation, "Absorption of Nutrients".
2. Slide projector
3. Screen
4. Tape player
5. Individualized instruction module, "Absorption of Nutrients".
6. Anatomical models and/or charts as available.

	(Name)	(Date)	Special Learning Features For:
Written By:	D. Hathaway	9-78	
Revised		83	
Instructional Delivery System By:			

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INFORMATIONAL ASSIGNMENT: (TEXT, REFERENCE BOOKS, INFO. SHEETS, ETC.)

1. Slide/tape presentation, "Absorption of Nutrients".
2. Student information packet, "Absorption of Nutrients".
3. One of the following or similar information in student's text.
   Anthony, Catherine and Alyn, Irene, Structure and Function of the Body, pp. 106-109, C. V. Mosby Co. 1976.

REFERENCES: (BIBLIOGRAPHY DATA)

In addition to the above:

1. Anthony, Catherine and Kolthoff, Norma, Textbook of Anatomy and Physiology, C. V. Mosby Co. 1975.
2. Guyton, Arthur, Textbook of Medical Physiology, W. B. Saunders Co. 1976.
3. Spence, Alexander and Elliott, Mason, Human Anatomy and Physiology, The Benjamin/Cummings Publishing Co. Inc. 1979.
4. Marjorie Miller and Lutie Leavell, Anatomy and Physiology, 16th Edition, Macmillan Publishing Co. 1972.

INTRODUCTION: (SET INDUCTION: TO PREPARE STUDENTS FOR THE LESSON)

In the last lesson we learned how the food we consume is digested. In this lesson we will look at how this digested food is absorbed and utilized by the body. An understanding of these processes is of importance to you for unless our food is absorbed it cannot be used by the millions of cells composing our body. And if the cells are not utilizing nutrients, body processes cease. Malabsorption and altered utilization of nutrients is seen to some extent in most gastrointestinal disorders whether mild or severe in nature, making these common problems encountered by health care workers.

LESSON PLAN # HO-R83-507

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 507 — Gastrointestinal System
(Unit or Block Title)

INFORMATION TOPIC # 507 (Technical - General - Guidance)

TITLE: Absorption of Nutrients

OUTLINE:

- I. Absorption - passage of a substance through a membrane II #1
  - A. Stomach
    - 1. Limited to size of material
    - 2. Primarily water
  - B. Small intestine
    - 1. Folds and villi II #2
    - 2. Absorbed by blood and lymph vessels II #3
    - 3. Products absorbed include
      - a. water
      - b. nutrients
      - c. electrolytes
      - d. some mineral salts II #4
  - C. Large intestine
    - 1. Absorption continues but to a greatly reduced degree II #5
    - 2. Products absorbed include
      - a. water
      - b. sodium
      - c. chloride
      - d. vitamins
    - 3. Products remaining form feces
- II. Metabolism - chemical and physical activities whereby nutrients are used by the body
  - A. Anabolism - production of complex compounds from simple compounds
    - 1. Example: compounds produced
      - a. hormones
      - b. enzymes
      - c. proteins
  - B. Catabolism - breaking down nutrients for use as energy II #6
  - C. Carbohydrate metabolism
    - 1. Anabolism - glycogenesis
      - a. liver converts glucose to glycogen
      - b. glycogen is stored in liver for use by body cells
    - 2. Catabolism - glycolysis II #7
      - a. releases energy
      - b. glycogen converted to glucose
  - D. Fat metabolism
    - 1. Catabolic process - ketogenesis II #8
    - 2. Anabolic process - allows fat to be stored in adipose tissue

E. Protein metabolism
   1. Catabolic process - breaks down protein which is released in urine as urea
   2. Anabolic process - protein is retained for tissue building

III. Summary and conclusion
   A. Areas where absorption occurs and structures involved
   B. Metabolism
      1. Anabolic process
      2. Catabolic process
      3. Carbohydrate
      4. Fat
      5. Protein
   C. Conclusion - This completes the unit on the gastrointestinal system. Before continuing on to the next unit you may wish to review portions of this unit to ascertain your understanding of this subject area.

LESSON PLAN # HO-R83-507

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 507 — Gastrointestinal System
(Unit Title)

INFORMATION TOPIC # 507 or DEMONSTRATION #

INTERACTION ITEMS (To Be Keyed For Use During Presentation)

1. What is absorption?
2. Rugae increase the surface area of the stomach, what structures increase the surface area of the small intestine?
3. What is the name of the lymph vessel located in the villi?
4. What kind of substances are absorbed in the small intestine?
5. What sections of the colon would be considered the proximal portion?
6. Distinguish between anabolism and catabolism.
7. What is the difference between glycogenesis and glycolysis?
8. What is the process called that occurs in fat metabolism?

CLASSROOM, LABORATORY, SHOP OR OTHER ACTIVITIES:

1. List the places where absorption occurs.
2. Define the following terms:
   a. metabolism
   b. catabolism
   c. anabolism
   d. glycolysis
   e. glycogenesis
   f. ketogenesis

LESSON PLAN # HO-R83-507

COURSE TITLE/NO. BODY STRUCTURE AND FUNCTION

UNIT # 507 — Gastrointestinal System
(Unit or Block Title)

EVALUATION ITEMS: (Oral, Written, or Performance to measure attainment of lesson objectives)

(See Student Evaluation)

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HO-R83-507

ACTIVITY SHEET
KEY

1. Before food is ready to be absorbed what must have occured?

   It must have been digested.

2. What is absorption?

   Passage of a substance through a membrane.

3. List the places where absorption occurs.

   Stomach, small intestine, and large intestine

4. Rugae increase the surface area of the stomach, what structures increase the surface area of the small intestine? The villi

5. What is the name of the lymph vessel located in the villi?

   The lacteal

6. What is metabolism? Metabolism refers to all the physical and chemical activities whereby nutrients are utilized.

7. Anabolism is the production of complex compounds from simple compounds whereas catabolism is breaking down nutrients for use as energy

8. List three examples of compounds produced by anabolism.
   a. hormones
   b. enzymes
   c. proteins

9. What is glycogenesis? A process whereby the liver converts glucose to glycogen.

10. What is glycolysis? Energy is released in the form of glucose from glycogen stored in the liver.

11. In fat metabolism the catabolic process is called ketogenesis.

12. What happens during the catabolic process involving protein?

protein is boken down which is released in the urine as urea

HO-R83-507

___ Pre-test

___ Post test   Student ______________________

STUDENT EVALUATION
KEY
Absorption of Nutrients

1. Place an A in front of the following parts of the digestive system where absorption occurs:
   - ___ Mouth
   - ___ Pharynx
   - ___ Esophagus
   - A Stomach
   - A Small intestine
   - A Large intestine

2. What structures in the stomach help increase absorption? the rugae

3. What structures in the small intestine help increase absorption? the villi

4. Match the following statements to the appropriate term or phrase.

   - I All the physical and chemical activities whereby nutrients are used.
   - A Production of complex compounds from simple compounds.
   - D Process whereby the liver converts glucose to glycogen.
   - E Process whereby energy is released in the form of glucose from glycogen stored in the liver.
   - F Passage of a substance through a membrane.
   - B Breaking down nutrients for use as energy.
   - H The catabolic process associated with fat.
   - C An example of a product produced by anabolism.
   - J Process whereby protein is retained for tissue building.

   A. Anabolism
   B. Catabolism
   C. Enzymes
   D. Glycogenesis
   E. Glycolysis
   F. Absorption
   G. Utilization
   H. Ketogenesis
   I. Metabolism
   J. Anabolic process of protein metabolism
   K. Catabolic process of protein metabolism

HO-R83-507 ABSORPTION OF NUTRIENTS - SCRIPT

1. This is a presentation of The Media Center, State Fair Community College, Sedalia, Missouri.

2. HO-R83-507 ABSORPTION OF NUTRIENTS is the final module in the Gastrointestinal Unit for the course, Body Structure and Function.

3. In this module, you will learn about the absorption of nutrients which are the end products of digestion.

4. Following completion of this module you should be able to: (1) Define absorption.

5. (2) Recognize areas where absorption occurs.

6. (3) Identify structures in the small intestine which aid in the absorption of nutrients.

7. (4) Describe metabolism.

8. (5) Differentiate between anabolism and catabolism.

9. Absorption is the passage of a substance through a membrane such as the skin or mucosa into the blood.

10. The stomach is the first place where absorption occurs. The process in the stomach is limited to materials already of absorbable size which can pass through cell membranes. Practically speaking, water is the primary material absorbed in the stomach and only a limited amount of absorption occurs.

11. The greatest amount of absorption takes place in the small intestine where folds and villi increase the surface area to aid in absorption.

12. The products of digestion are absorbed into the blood and lymph vessels of the villi.

13. Products absorbed in the small intestine include water, nutrients, electrolytes, and some mineral salts.

14. Absorption continues in the large intestine but to a greatly reduced degree with most of the absorption occurring in the proximal portion of the colon. Products absorbed in the large intestine include water, sodium, chloride, and vitamins.

15. Products not absorbed in the large intestine form fecal material consisting of water and solids such as mucus, food residue, microorganisms, and sloughed off epithelial cells.

16. Digestion and absorption are only preliminary steps for metabolism. Metabolism refers to all of the physical and chemical activities of the body whereby nutrients are utilized.

17. There are two kinds of metabolism, anabolism and catabolism.

18. Anabolism is the production of complex compounds from simple compounds. Anabolism is the production of new compounds using nutrients present in the body.

19. Catabolism is the reverse of anabolism. Catabolism is the breaking down of nutrients for use as energy.

20. Examples of compounds produced by anabolism include hormones, enzymes, and proteins.

21. In carbohydrate anabolism, the liver converts glucose to glycogen, a process called glycogenesis. Glycogen is stored in the liver for use by body cells.

22. In carbohydrate catabolism, the process of glycolysis releases energy in the form of glucose from glycogen stored in the liver.

23. In fat metabolism, the catabolic process is called ketogenesis while the anabolic process allows fat to be stored in adipose tissue.

24. Protein metabolism occurs primarily in the liver. Here the catabolic process breaks down protein which is released in the urine as urea. In protein anabolism, protein will be retained, resulting in tissue building.

25. In this module you have learned about absorption of nutrients.

26. Absorption is the passage of substances through membranes into the blood.

27. Absorption occurs in the stomach, small intestine, and large intestine.

28. Folds and villi aid in the absorption of nutrients in the small intestine.

29. Anabolism and catabolism work in reverse and are two types of metabolism.

30. (CREDITS)

31. (DISCLAIMER)

32. (REWIND)